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JANUARY 1931

PENCIL POINTS

A JOURNAL FOR
THE DRAFTING ROOM

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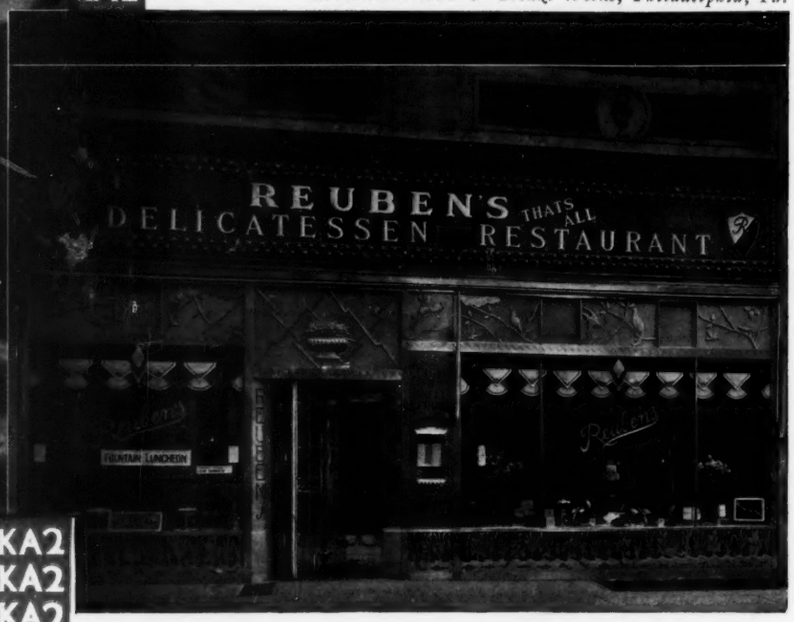
KA2 KA2

KA2 KA2

Reuben's That's All—Restaurant Front, Philadelphia. Enduro Nirosta with other metals for decoration. Executed by Leober Ornamental Iron & Bronze Works, Philadelphia, Pa.



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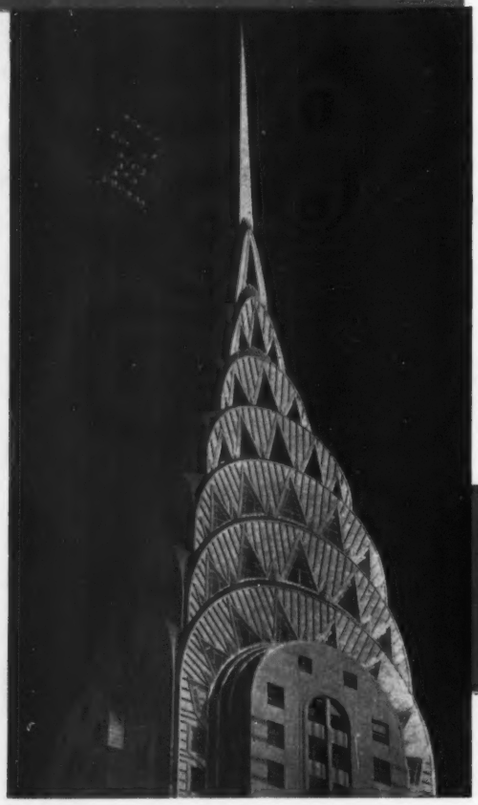

A splendid example of Enduro Nirosta decoration on the Chrysler Tower, New York, William Van Allen, Architect.

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Architecture
Wahr

A Bulletin from the A. I. A.

Graduates of the foremost schools of architecture here and abroad have been thrust into the ranks of the unemployed. In the region of New York it is estimated that there are 3,000 architects and 12,000 architectural draftsmen.

Investigation indicates that at least ten per cent. of this number are in need. Among them are former university teachers, practicing architects, and men who have won prizes and medals for outstanding achievement in their profession.

Nearly 500 have registered at the Bureau set up by the Architects' Emergency Employment Committee at the Architectural League Building, 115 East 40th Street, with Julian C. Levi, fellow of the American Institute of Architects, as chairman, and Harvey W. Corbett, Chairman of the Architectural Commission of the Chicago World's Fair of 1933, as treasurer.

The New York and Brooklyn Chapters in the American Institute of Architects, and the architectural societies of Westchester, Long Island, and New Jersey, as well as kindred organizations, are cooperating in the work of finding jobs. Thirty or more new applicants register daily at the Bureau, which is in charge of Mrs. Lyda M. Nelson.

Many of the registrants evidence urgent need. Skilled men who have earned more than $5,000 a year are now lucky if they can earn the emergency stipend of $15 a week, it is said. One man "would drive a truck." Another "would gladly do anything however menial." More than three-quarters of the idle draftsmen have from one to three persons dependent upon them for support. Their ages range from 24 to 60, and their experiences from 2 to 41 years.

Among them are men who have received degrees from New York University, the College of the City of New York, Columbia University, the Yale School of Fine Arts, the Beaux Arts Institute, the Ecole des Beaux Arts, Cornell University, Massachusetts Institute of Technology, and the Universities of Pennsylvania, Wisconsin, Illinois and Michigan.

The majority have served long apprenticeships in offices of leading architects in New York, London, and the ateliers of Paris. They include men who have worked on buildings such as Washington Cathedral, where Admiral Dewey and President Wilson are buried, and the Stanford University buildings.

The Architects' Committee, in collaboration with the Emergency Work Bureau of the Emergency Employment Committee headed by Seward Prosser, has so far been able to give employment to only fourteen of the most needy draftsmen on the basis of $5 a day for a three-day week.

One of the first draftsmen to work at the emergency rate of $15 a week is a University of Pennsylvania graduate with a wife and two boys to support. In addition to his university training he has studied in Europe and has fine New York references. He has earned $100 a week, but as he has been out of work for a year, his resources are exhausted, and his plight is desperate.

Another draftsman who has joined the long line which forms at four o'clock in the morning outside the headquarters of the Emergency Work Bureau at 40 Wall Street is a man with a wife and three children to support. His earnings have been $80 a week. Despite his eleven years' experience and the beautiful drawings he has to show, the rent has been paid only through December 15, and there is no hope of adequate earnings to meet expenses.

These two draftsmen are typical of the fourteen men with wives and two or three dependent children who are considered fit candidates for relief.

However, the Emergency Work Bureau has not the facilities to take care of such cases as that of the Columbia University graduate who also studied at the Beaux Arts Institute of Design, and now has a wife and mother to support. He has been out of a job for the last six months.

He is 34 years old, has previously been employed for eight years as chief designer with three of the foremost architects' firms in New York, and his work has often illustrated one of the leading architectural magazines. He now seeks work on a part or full time basis as architect's renderer.

The case of the Cornell man who is a bachelor, 42 years old, with 17 years' experience and first-rate references, who has been out of work for the last eight months and "will accept any employment," having just recovered from two months' illness, also falls outside the province of the Emergency Work Committee.

The 24-year-old man who recently completed the five-year course in mural decoration at the Yale School of Fine Arts, whose father is now out of work, whose brother and sister are too young to work, and who had earned $40 a week toward their support, is another instance of the calibre of the draftsmen seeking work.

One of the applicants now in urgent financial need has been awarded the medal of the American Institute of Architects for distinguished work. One, with a dependent wife, has been out of work for the past four months.

Another man now eager to find employment as an able architectural draftsman is a former member of the American Institute of Architects and of the Beaux Arts Society. He has had forty-one years' experience and has done brilliant work in New York, Chicago and South America. He is now about 60 years old, and has a wife dependent upon him for support.

Reasons for unemployment are various. Many are traceable to the slowing up and cessation of building projects, and the complete shutdown of architectural departments in banks, and other institutions.

In response to the appeal of the Architects' Emergency Committee, only four organizations requiring the services of architectural draftsmen have so far notified the Committee of positions that may be open.

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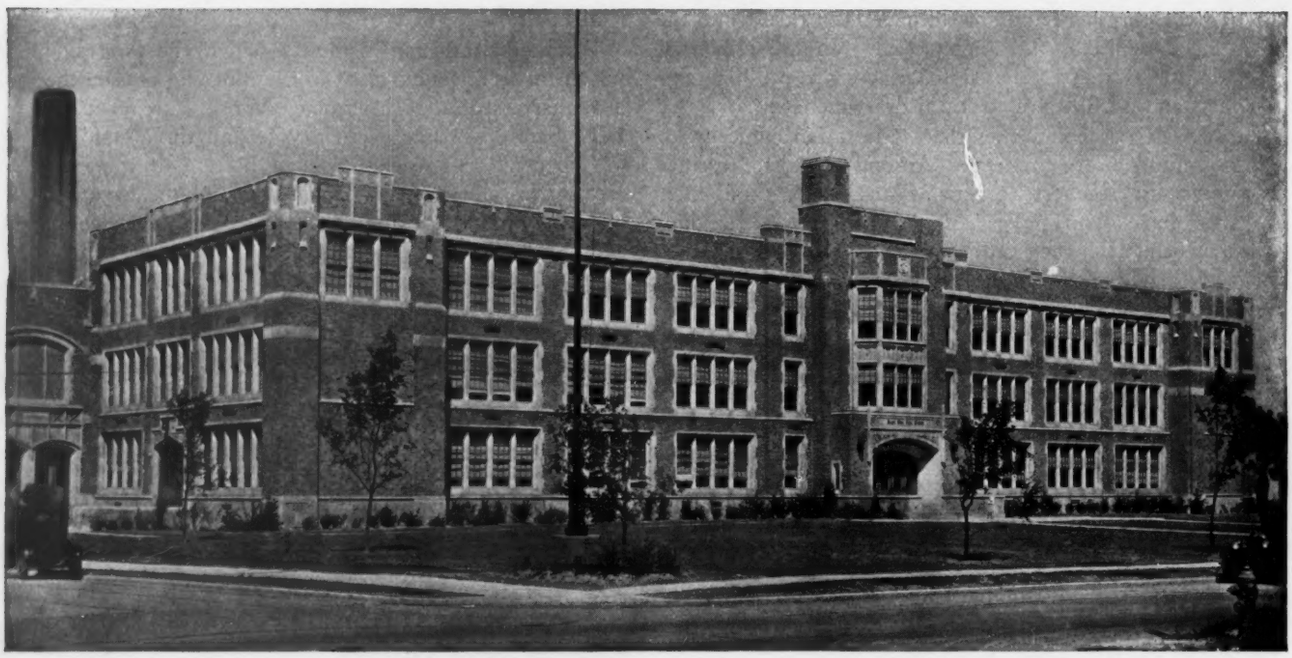

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Ralph Reinhold, *President*, L. F. Nellis, *Vice-President*, William V. Montgomery, *Secretary*

Let's Make It a Happy New Year

As we go into 1931 we sincerely wish every one of our readers increasing happiness and prosperity for the coming year. At the present moment, things probably look pretty dark to many architects and draftsmen. Lack of work and the accompanying lack of income which has been the lot of hundreds of men in the profession in recent months make it hard and almost impossible for them to be cheerful. Yet that hope which springs eternal in the human breast bids us all to carry on with confidence that better times are coming. Buildings have got to be built in the future as in the past and there must be architects and draftsmen to design and detail them.

A bulletin circulated in New York by the American Institute of Architects paints a truly discouraging picture of present conditions. It is estimated that in the region of New York there are 3,000 architects and 12,000 draftsmen. The report states that at least ten per cent. of this number are unemployed and in need. The Architects' Emergency Committee is doing its best to cope with the problem of finding work for these men where no work exists, but the response to its appeal has so far been slow. On the second preceding page we have printed the A.I.A. bulletin in full, hoping that it may reach the eyes of some architects who have been successful in getting new jobs and who may be in immediate need of men. To any such the proper course will be obvious.

Those who are not now in a position to take on more men will, we hope, work just a little harder to persuade their lagging prospects that now is the time to build. The truth will be back of their arguments and lend them strength. Every man in the profession can do his bit to start things going if he will seize every opportunity to point out to the layman the advantages of investing money in buildings at the present time.

In our last issue we stressed this point but it is worth keeping at it until things get under way. Materials can be bought cheaper and labor is more efficient than when everything is rushed. The architect and his men can study their jobs more carefully which will be to the advantage of the owner. There are many valid arguments all pointing in the same direction.

Of course, business might not be so good for order takers now, but there really seems to be plenty for real salesmen. Constructive, intelligent sales efforts are as productive now as ever and the results stand out more clearly amidst the dimness of this well advertised depression. Plenty of elbow grease plus straight thinking will make 1931 as sound and prosperous as anyone could wish.

Build your sales properly and people will build.

Contents

for January, 1931

Frontispiece, Etching, "Exeter Cathedral" *By H. Gordon Warlow*	
Apples *By William Williams*	1
On the Making of Pictures and the Thumb-nail Sketch *By George Nelson*	3
More Anent the Stair Rule *By George Eichenlaub*	11
The Pyramider *Told to W. B. Warner by R. W. Meadows*	19
The Geometry of Architectural Drafting—14 *By Ernest Irving Freese*	25
Plates	37-46
Some Notes on the Mission Play *By Norman H. Kamps*	49
Winning Designs, Worcester Memorial Auditorium	53
Here & There & This & That	65
Knobloch Construction Details	69 and 71
The Specification Desk	73
Plastic Paint *By Jeannette Kilham*	81

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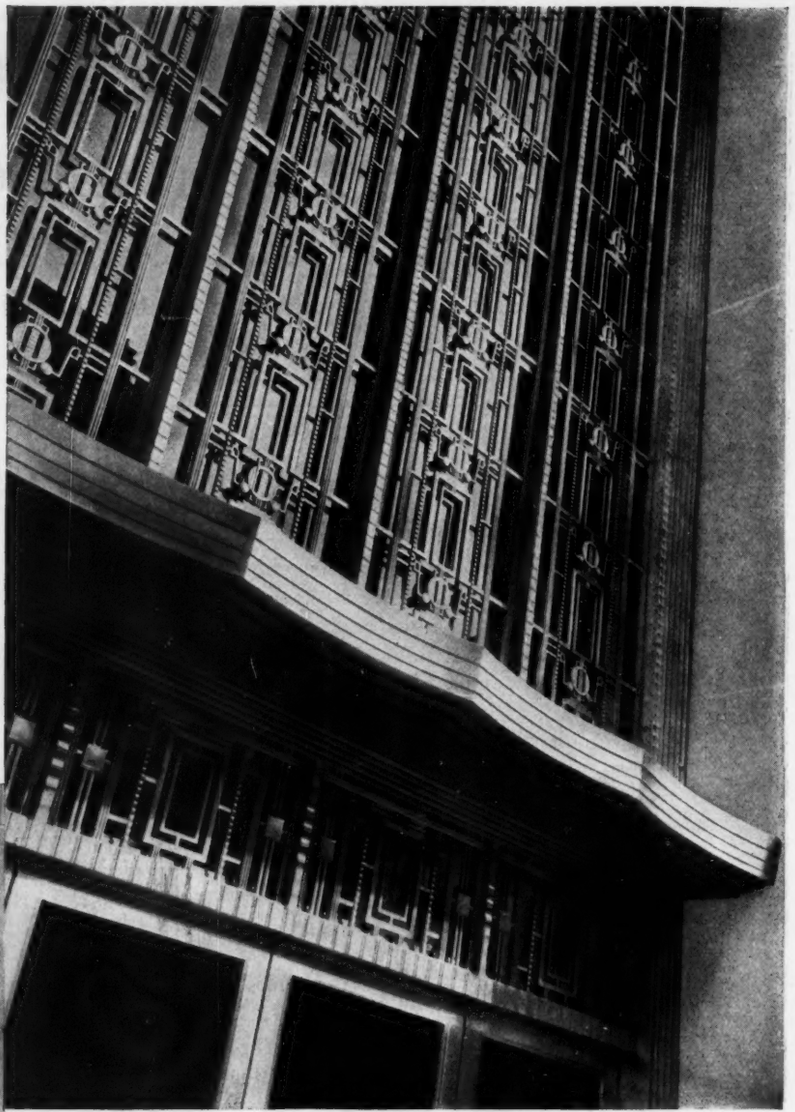
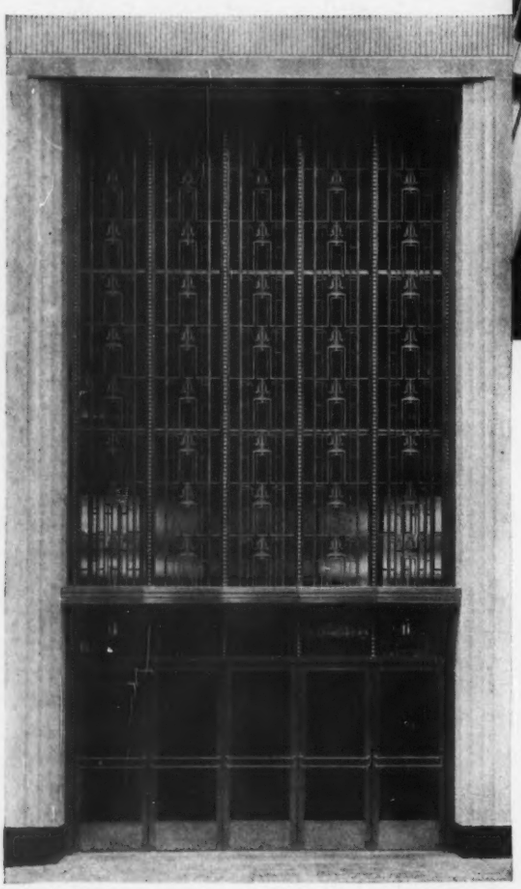
EDITORIAL AND BUSINESS OFFICES, 419 FOURTH AVENUE, NEW YORK.

James B. Newman
of the Firm of Ely Jacques Kahn
describes

"AN ENTRANCE OF DISTINCTION"





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"The time of delivery was of vital importance, setting more than any other factor the opening date of the store. The entire inner and outer entrance metal work was installed by the General Bronze Company five days ahead of schedule, while at the same time their craftsmen were kept out of the way of the other trades."

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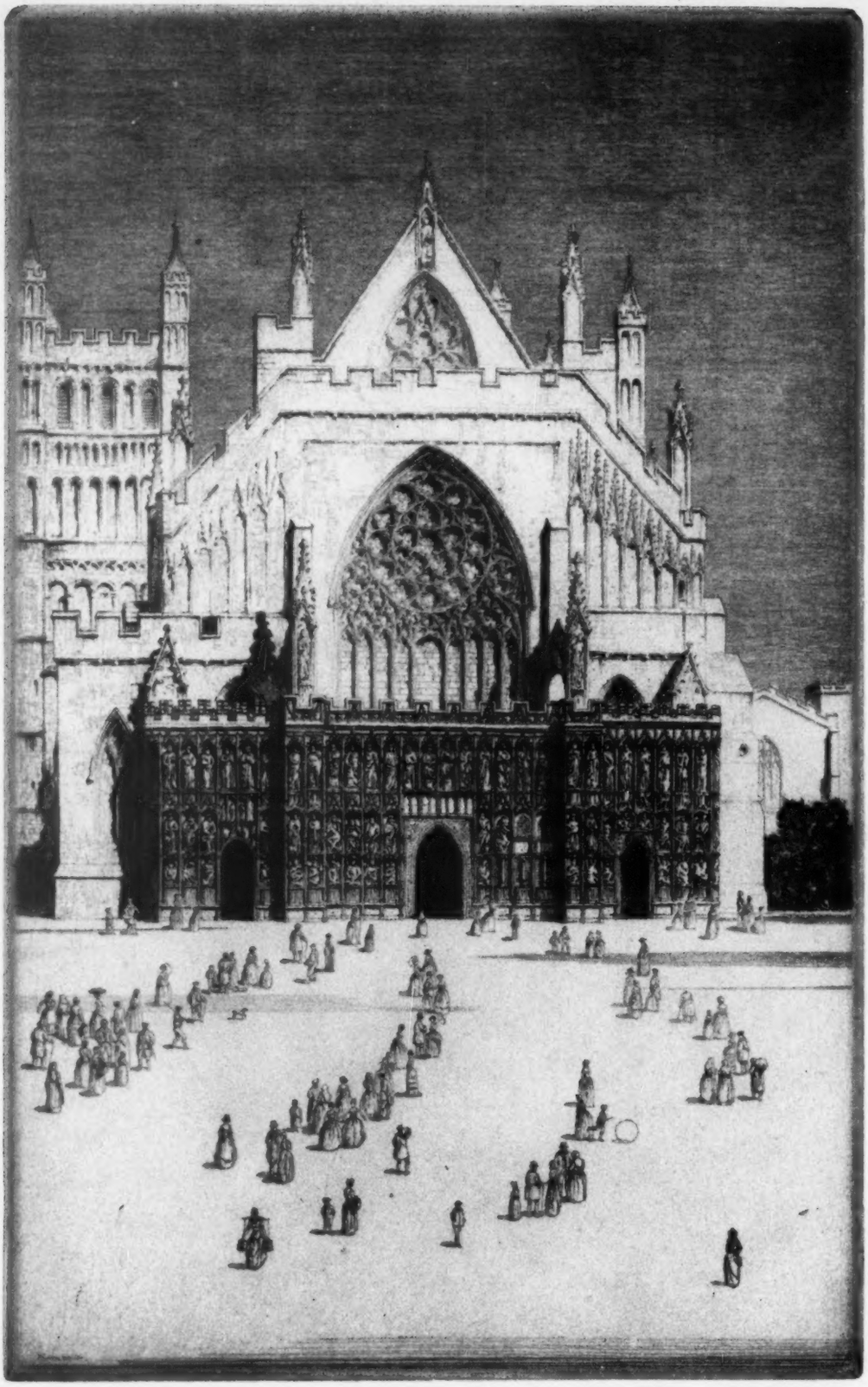


EXETER CATHEDRAL
FROM AN ETCHING BY H. GORDON WARLOW
Reproduced by courtesy of Kennedy and Co.

PENCIL POINTS

Volume XII January, 1931 Number 1

Apples!

By William Williams

A draftsman who can look death in the face and laugh might be amused at the architectural situation. Most of us can't. A lot of us haven't even got a situation to laugh at, certainly not *in*. It has been rumored that at least six members of the Architectural League are selling apples in the financial district. How they managed to get the apples has not been learnt, nor, as far as I can discover, do their colleagues care. As long as they muffle themselves up well, so as not to be recognized by past or future clients, that is all that the League, in these trying times, can expect.

At least a man selling apples has got a job, and that's something. Moreover, there is still a chance for a good architectural man to distinguish himself, even on this humble plane. It was, indeed, in the extraordinary skill displayed by an apple vendor that attention was drawn to the fact that architectural men have been reduced to this ignominious role.

Here was a man the casual observer would not have taken for a draftsman at all. There was about him a sense of dignity not commonly found in architectural circles. But he was young, the rounding of his shoulders had barely begun. Blank honesty, the light of idealism and creative ambition still shone—faintly, it is true, but still shone—in his face; he had not yet learned to steal with the insouciance of his seniors. No one would take him for a Beaux Arts graduate, a Phi Beta Thingumajig, and all the other things he turned out to be. But there he was; and there were his apples, piled up on his box as only an architect could pile them.

I stood for a moment spellbound, fumbling for a nickel. "Well!" I said. "Well!" And that is all I could say. Here was genius, rotting, so to speak, in the gutter. Such mass! Such a feeling for balance, proportion! Such a study in set-backs!

And then, as I found a nickel, my courage failed, a lump rose to my throat. I put the money back into my pocket and shook my head. "No," I said, "I haven't got the heart," smiling at the bright young man in admiration.

"An apple, sir? A nice rosy Skookum?"

"No," I said again, a certain amount of uncontrollable compassion in my voice, "I'd like to, but as I say—I haven't got the heart."

"Haven't got the heart," he repeated, "haven't got the heart!"

It was plain that he didn't understand, not realizing his genius. But I could see that one apple off the top of his pyramidal structure would have ruined it, would have been like taking the beautiful golden crown from the summit of the New York Central building. I couldn't do it.

"I don't want to spoil it, son," I explained. "Your design—it's perfect!"

"Ah, do you like it?" he said, recognizing at last the critic in me, the connoisseur, the fellow architect. "Do you like it?" He rubbed his hands with satisfaction as I nodded my approval.

"I'm glad you do," he said, "there's years of study behind all that."

"I can see it," I said.

"There is," he added, looking wistfully at somebody's chewing tobacco lying on the curb, "there is."

And then he told his story: how he had graduated in architecture with honors, won a traveling scholarship, come back, taken his master's degree; how he had been made honorary member of half a dozen societies; how he had been working on his first book, "The Relation of Design to Industry," when the slump came. At this time he was chief designer for a small firm doing big work—or a big firm doing small work—I forget which. But it doesn't matter—he was a designer and he had a job.

At this point he broke into a sob and I, so innocently stumbling upon all this misfortune, could hardly constrain my tears.

His office, he went on to tell me, closed three weeks after the stock market crash, owing to the wife of one of the members of the firm losing so much on the curb, or somewhere. Anyway, he lost his job and walked the streets ten days, when he managed to get another job that lasted two months. Then he walked the streets again, this time for two months before he got a job, which lasted only ten days.

That was four months ago, and now the unfortunate wretch is selling apples.

"But tell me," I said, as I put my hanky back in my pocket, "how does a man of your creative genius manage to sustain himself—mentally, I mean? It must be awfully monotonous standing in one spot like this, doing nothing, so to speak—awfully monotonous."

He laughed in his throat. "No," he said, "it's not as bad as that. I manage to amuse myself. There's always something to be seen on the sidewalks of New

York." And I caught his eye following a plump little blonde. "Take, for instance, the other day. I saw an old blue-print runner hot-footing it along 42nd Street with two new drafting table drawers in his hands—and I couldn't help but laugh—there were six or eight draftsmen trailing him to find out where he was going to deliver them. Things like that strike you as funny when you've been standing in the cold six or eight hours."

He was grinning, so I grinned too. Though to tell the truth I was feeling far from it.

"It's little things like that," he continued, "that help to pass the time. And then, of course, there's always the apples," he was looking at his fruit, "there's no end to what you can do with a box of apples. This design here," he said, indicating the pyramidal effect, "is purely imaginative, just an attempt to superimpose one rhythm on another, a minor rhythm on a basic rhythm. Do you ever read Mr. Walker's articles? Well, never mind, you get the idea. Sometimes I work it out in color. You've noticed that one side of nearly all these apples is green, haven't you? It's simple.

"But I don't always do these sketches, as I call them, sometimes I try to do a building from memory, or one that I can see from here. Yesterday I tried to do the Chrysler, but I couldn't get the effect without using matches, and that spoils the apples. There's really no end to what you can do. And then there's always the chance that somebody'll come along just when the thing's taking shape and pick out half a dozen from the bottom, and you've got to start all over again."

I was stirred by the young man's keen enthusiasm for his art even under the trying circumstances of adversity, and I asked him if he'd leave his apples for an hour and have lunch with me. But he couldn't come, having to attend an alumni luncheon at the Fraternity Club.

"It's too bad," I said, by way of consolation, as I moved, about to leave him. "What are we going to do? We're all more or less in the same boat, you know."

"We ought to do something," he murmured.

"Yes, we ought to do something," I repeated, nodding my head, knowingly.

"Yes."

"But what?" I asked.

He wiped his nose on his sleeve. "I don't know," he said, "I don't know that we can do anything to relieve the situation. But we might take advantage of it."

"Take advantage of it, how?"

"Well," he replied, and there was a mischievous glint in his eye, "now that architects have nothing to do, we might take a minute or two off to look over what we have been doing in the past ten years. Now that there's nothing to do I know a lot of chaps who could put in some valuable time practicing.

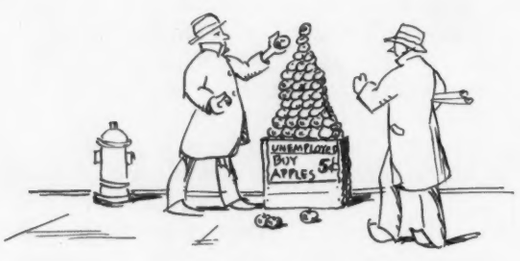
"Look at all this tripe," and he waved his arms in the air, in a wide, embracing sweep of the Grand Central zone, "look at it all, every bit of it put up since 1920, and not a building worth a second look. Practice, that's what the boys need, practice, they don't know the fundamentals, don't know the elements."

He was obviously mad. I felt uneasy and edged away a bit. But he moved towards me. And taking me by the lapels of my coat, he stared into my face with a wild, frantic stare.

"It's our education," he breathed into my face. "Our education. The whole weakness of our architectural education. Architects should be trained to design in three dimensions, build up their masses with clay, work in the solid, always in the solid, do away with line drawings with their artificially rendered lights and shadows, do away with paper entirely until they've got the mass right, the relation of the parts—then start the mechanical business of drawing, committing the thing to paper. Work in the mass, always in the mass, get the parts right."

I grinned, to conceal my embarrassment. The hard times had gone to his head. Underneath his genius, he was cracked. And with one more admiring glance at his handiwork, an imaginative building done in Skookums, I left him.

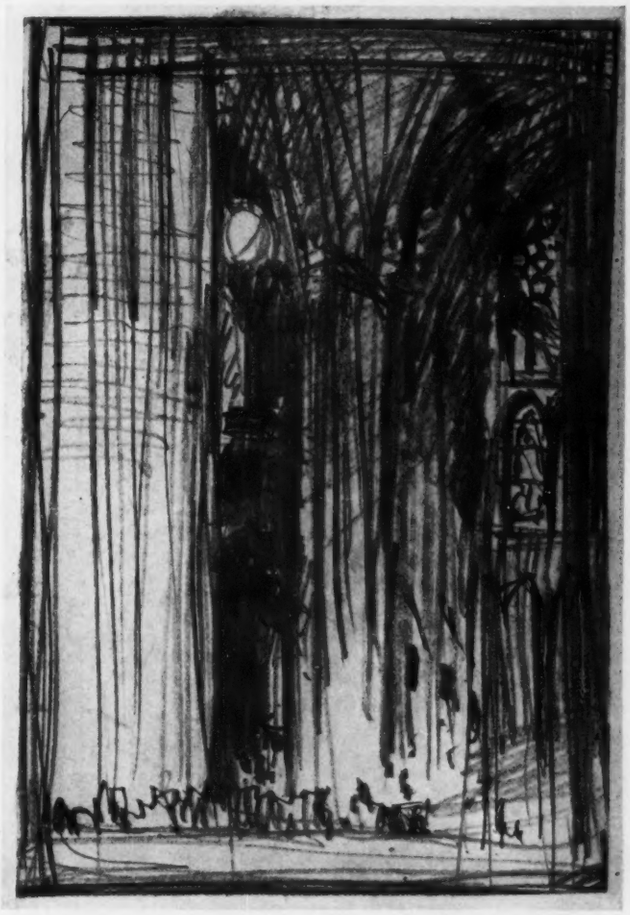
But all that afternoon as I walked around town, his words kept ringing in my ears—"There's no end to what you can do with a box of apples."



On the Making of Pictures and the Thumb-nail Sketch

By George Nelson

Sketches may be divided, generally speaking, into two classes. One type is made to record facts. It is a document. Made by an architect, it may show the arrangement of voussoirs in an arch, the profile of a moulding, the effect of a group of buildings. Such a sketch, made by a painter, might be concerned with different objects, but the end in view would be the same. These are usually made with the greatest rapidity and economy of effort consistent with whatever accuracy is desired. They may be, and often are, very beautiful bits of drawing, such as Brangwyn's pencil and sanguine studies for etchings, or Michelangelo's anatomical studies, or they may be all but unintelligible to anyone but the artist, like Roerich's pencil notes for his powerful Tibetan landscapes—but they are all the same in that all were made to record facts for future use.



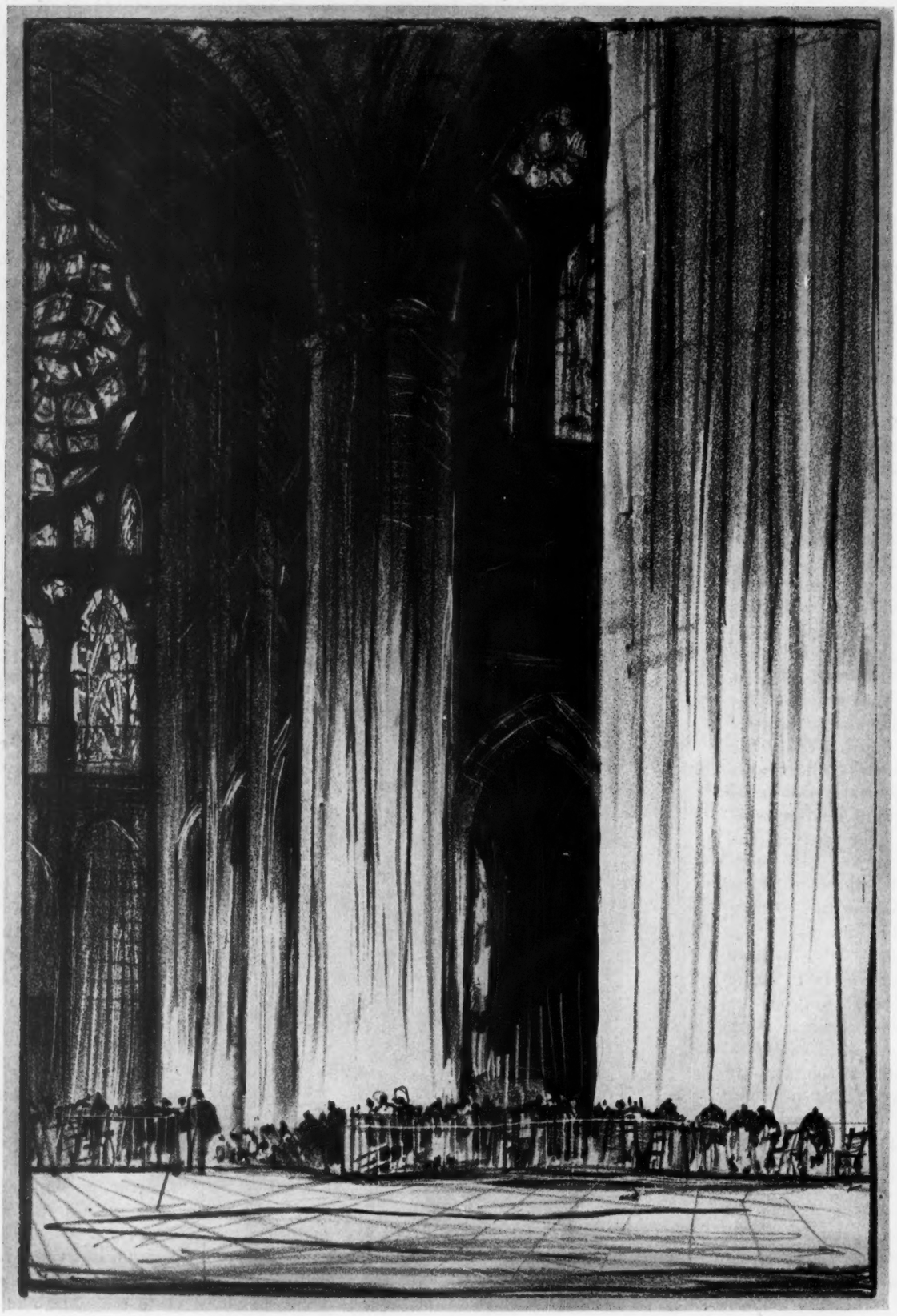
THUMB-NAIL STUDY FOR A LITHOGRAPH

Reproduced at exact size of original.

The other type is a picture. It's only purpose in life is to create an impression on the beholder, when hung on a wall in an appropriate environment. It may be that it causes the observer to have a feeling of great pleasure in its harmony of line, and color, but should the reaction be one of complete mystification, or even of actual disgust, as is often the case in these days of flourishing galleries of modern art, it still remains in the same category, because the artist is in no way limited to any particular sort of impression. In this type of sketch—which might be called decorative—should a modillion, or an entire cornice be omitted, or a thick grove of trees introduced where there was actually a bush and three tin cans, no one thinks the less of it except those unfortunate souls, reared on bargain basement oil paintings and picture post cards, whose sole artistic criterion is versimilitude.

In this classification, as in all others, there cannot be a definite line drawn. For example, a water color by Bonington or Walcot, an etching by Meryon or Rushbury or Rosenberg—any of these might be used to obtain information about their subjects, so accurately are they drawn. And conversely, many sketches made solely for the artist's information might be classed as works of art. Nevertheless this differentiation may well be adhered to, and, when applied to most architects' sketches, is peculiarly appropriate because it is a common misfortune of draftsmen and students that when they go out to make a picture, they return, more often than not, with a document. Now, while one cannot possibly have any quarrel with anything as praiseworthy as seeking after more knowledge, the fact remains that most of us have a very strong craving to make pictures when we go sketching—gorgeously free and bold water colors, lithographs with smashing blacks and intense whites, and so on. We want things we can show with pride, which we can give away (without the usual financial strain) on necessary occasions, and even hope, perhaps, to be so fortunate as to sell some one day to weak-minded, but opulent, would-be patrons of art. The point is, how to get that way? How can we throw off the influence of school and office, which makes us want to put in everything we see?

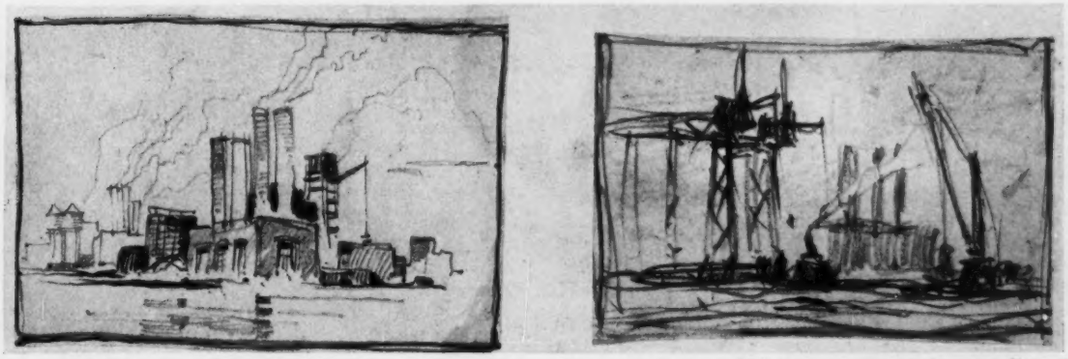
The fundamental difficulty, I think, lies in our con-



Original printed by Gaston Dorfinant

LITHOGRAPH BY GEORGE NELSON—"CHARTRES"

Size of original, 11½" x 17"—see small pencil study on page 3. Note that it is reversed like drawing on stone from which this print was made.



INDUSTRIAL SUBJECTS

The richest collections of patterns of light and dark anyone could want.

ception of what makes a picture. It is hard, when one is accustomed to constant concern with minute details, to careful and exacting work, to realize that a picture is more than an assortment of correctly drawn parts. The fact that the basis of any good picture, from time immemorial, has been a design, broad and simple, is one that we are, by training and daily practice, made peculiarly unfit to grasp. But grasp it we must, if we are to get anywhere in this business of making pictures. From this point of view it is interesting to look at painters' sketches, drawings which have been considered as works of sufficient merit to be placed in museums and private collections. Take a sketch by Claude, often little more, apparently, than a scribble, but with a composition that will defy the most careful analysis; or look at some of Turner's studies, or a water color by Cotman, or some of Sir Alfred East's landscape notes. Technically they frequently have no more tricks than those possessed by the merest beginner. Simply and rapidly done, they are nevertheless decidedly pleasant to look at, and their great skill becomes apparent only after considerable examination.

A CAREFUL STUDY

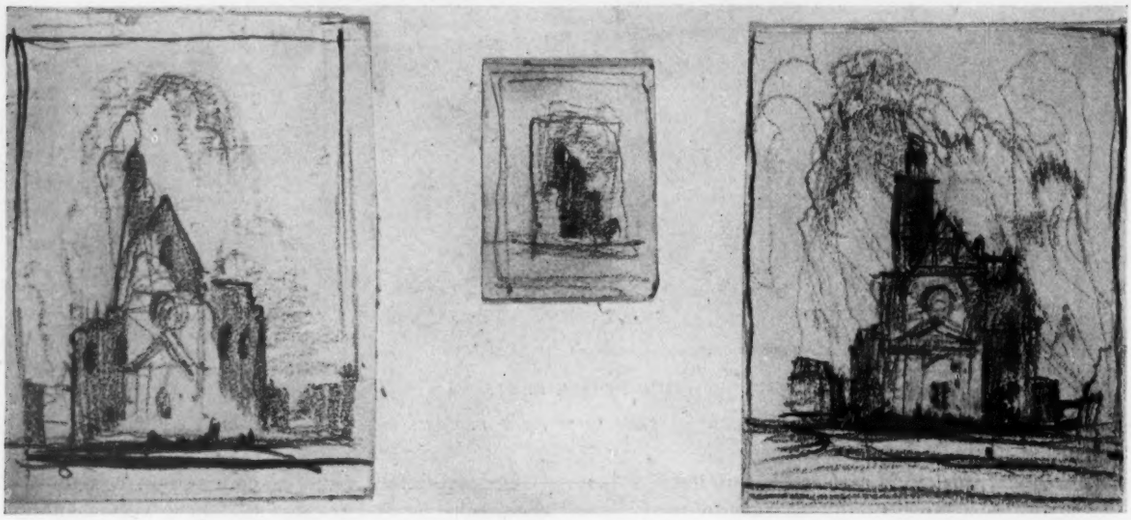
But detail is only faintly suggested.

Unfortunately, pictorial composition is a most elaborate subject, and most of us haven't time enough to sketch, let alone read books about it. There are a number of things one can do, however. Magonigle suggests sketching objects with which one is unfamiliar, clouds, boats, trees, and other irregular forms. I have also heard two excellent water colorists sing the praises of still lifes as a means of loosening one up. The practice which I have had most experience with, and the one which seems to bring one about to the desired "painter's approach" with less effort, and more directness than any other is the thumb-nail sketch.

It is about the size of a postage stamp, to start with, and is done with a soft pencil. Under these circumstances it will be found rather difficult to be tight. And while one might go on doing trees, boats, and flower pots in the same old dry way, when one is confronted by a space an inch square and a soft pencil there is absolutely nothing to do but worry about the biggest, and only the biggest, elements in the composition. Also, under such conditions, "technique," the great bugbear of the novice in sketching, espe-

YOU JUST CAN'T GET TIGHT IN A THUMB-NAIL SKETCH

All sketches shown are reproduced at exact original sizes.



STUDIES FOR A PENCIL SKETCH OF ST. ÉTIENNE DU MONT, PARIS

EXAMPLES OF ARBITRARY PLACING OF VALUES

cially pencil sketching, is reduced to its proper place.

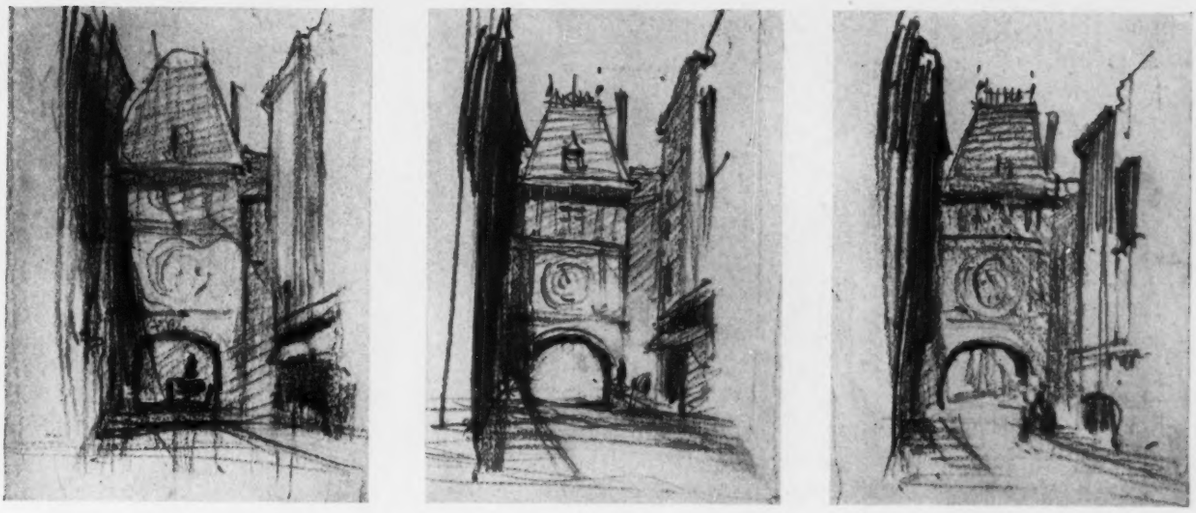
I have found that a good procedure is to make two or three tiny sketches, locating the masses of black, gray, and white, and then to work at a somewhat larger scale, keeping the same breadth and simplicity of pattern, but introducing a bit more drawing, to make sure that I wasn't fooling myself. These larger sketches not only simplify making the final one, but provide a tremendous incentive, because they are almost invariably better.

A LATER STUDY AT A LARGER SCALE

ALL THESE STUDIES WERE DRAWN AT SIZE SHOWN

Make lots of thumb-nail sketches. They are easy and don't take any time, and once that one becomes interested in making decorative patterns, the old feeling of reverence for the sacredness of subjects rapidly disappears. If a shadow spoils an otherwise good sketch, why not leave it out? No one will care. Should a tree, or a flight of steps be embarrassing, move them, or omit them. If your conscience bothers you, get a camera and take a good, accurate photograph of the scene—take several if it will make you feel any better—and then make the sketch as seems best. A good practice to indulge in occasionally, if one is particularly squeamish about omitting things, is to make one's thumb-nail sketches, and then to turn one's back to the subject and make the sketch from the little ones. This may mystify the onlookers, but it will result in an omission of a large part of the trimmings, and is likely to produce a considerably better sketch. From the thumb-nail sketch one can progress to numerous variations, working in line rather than value, in color, and in combinations. Make large sketches, using materials such as Conté, or litho sticks, or charcoal which force you to keep the broad simplicity of the miniatures. And keep away, for a time, from anything resembling a careful drawing. If you have a choice between making one careful sketch, and four rapid ones, do the four and buy a picture postcard of the first.

Try sketches on paper two feet square, and pretend you are making a thumb-nail sketch. It's good fun, and not as easy as it

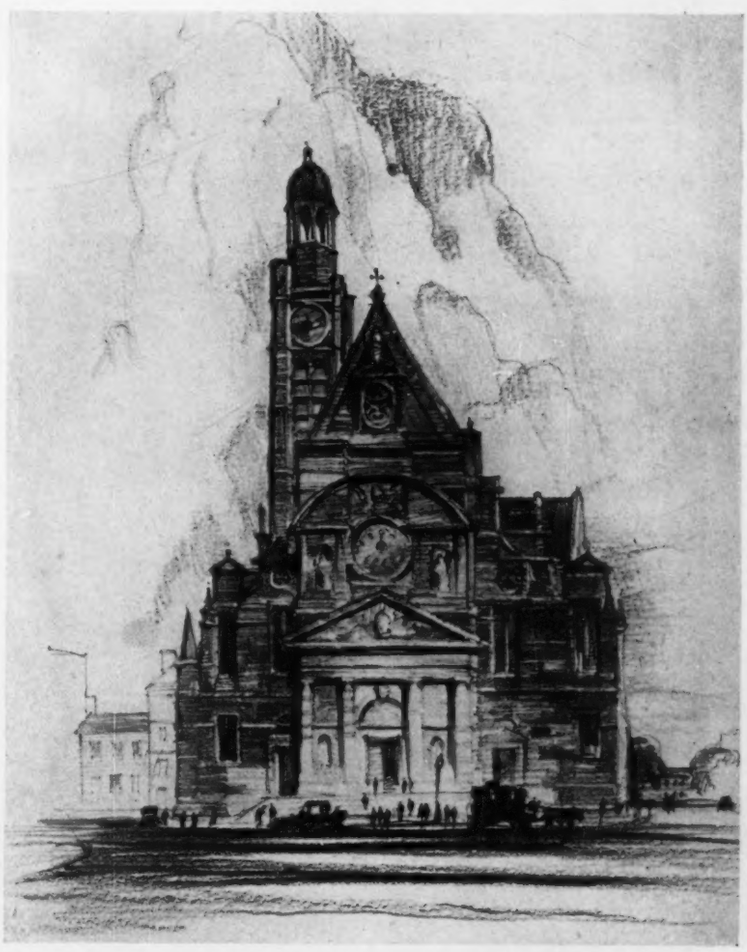


LIGHTING ARRANGEMENTS—AN ATTEMPT TO MAKE INTERESTING A COMMONPLACE SUBJECT

sounds, because just because a sketch is rapidly done is no excuse for bad drawing, and good drawing, which is largely suggestion, is not only much more effective and interesting than the painful rendering of every part of a sheet, but is infinitely more difficult. If these efforts are sincere attempts to make a truthful sketch, and "truthful" does not by any means imply "photographic," it will be rather surprising to note the greatly increased facility when it is necessary to make a careful and accurate drawing.

There is not any need to confine these overgrown thumb-nail sketches to black and white. With large sheets of rough paper and big brushes the same can be done in water color. Draw with the brush, and try again for effectiveness from simplicity. Think of Cotman, who could do a tree with one wash. Run washes as wet as possible, and if they drip off the board onto your lap, get a raincoat, but don't run them any drier. And it is also good to remember that a palette of seven colors is twice as good as one of fourteen; and that since pure colors are expensive, there isn't much sense in mixing three of them to make mud; and that inasmuch as good paper is also expensive, it isn't a bad idea to leave as much of it showing as possible.

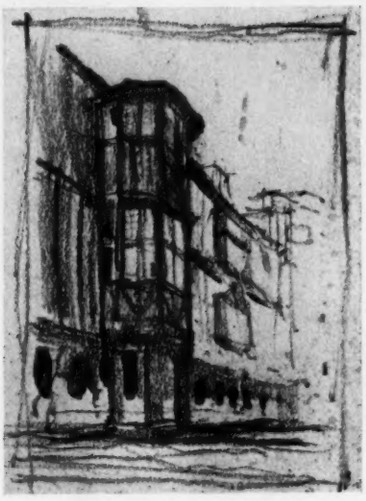
The thumb-nail sketches here shown are for the most part studies for larger sketches. Others were just made as experiments in the arrangement of values, and still others were copied from pictures, in an attempt to discover their basic patterns. The more of these you do, the better you will like them, and the more reasons you will find for continuing. They keep your pencil moving when there isn't ordinarily time to sketch, they encourage breadth and boldness, qualities which will begin to appear in your more careful work, and by the use of vague and indistinct forms will stimulate the imagination, and in this way will help to get rid of tightness, which is the one thing, more than any other, that will prevent one from making decent



FINAL PENCIL SKETCH FROM STUDIES ON FACING PAGE

THIS DRAWING IS SHOWN SOMEWHAT REDUCED

1



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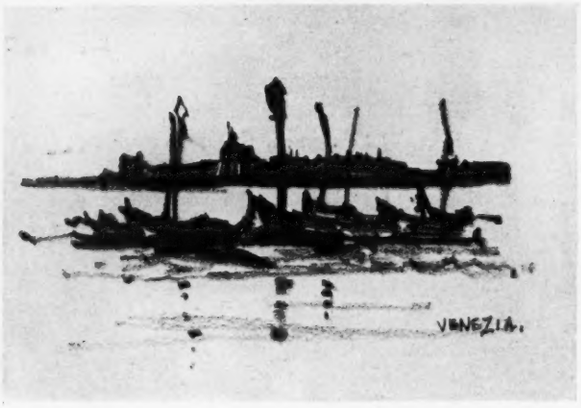
2



5

3

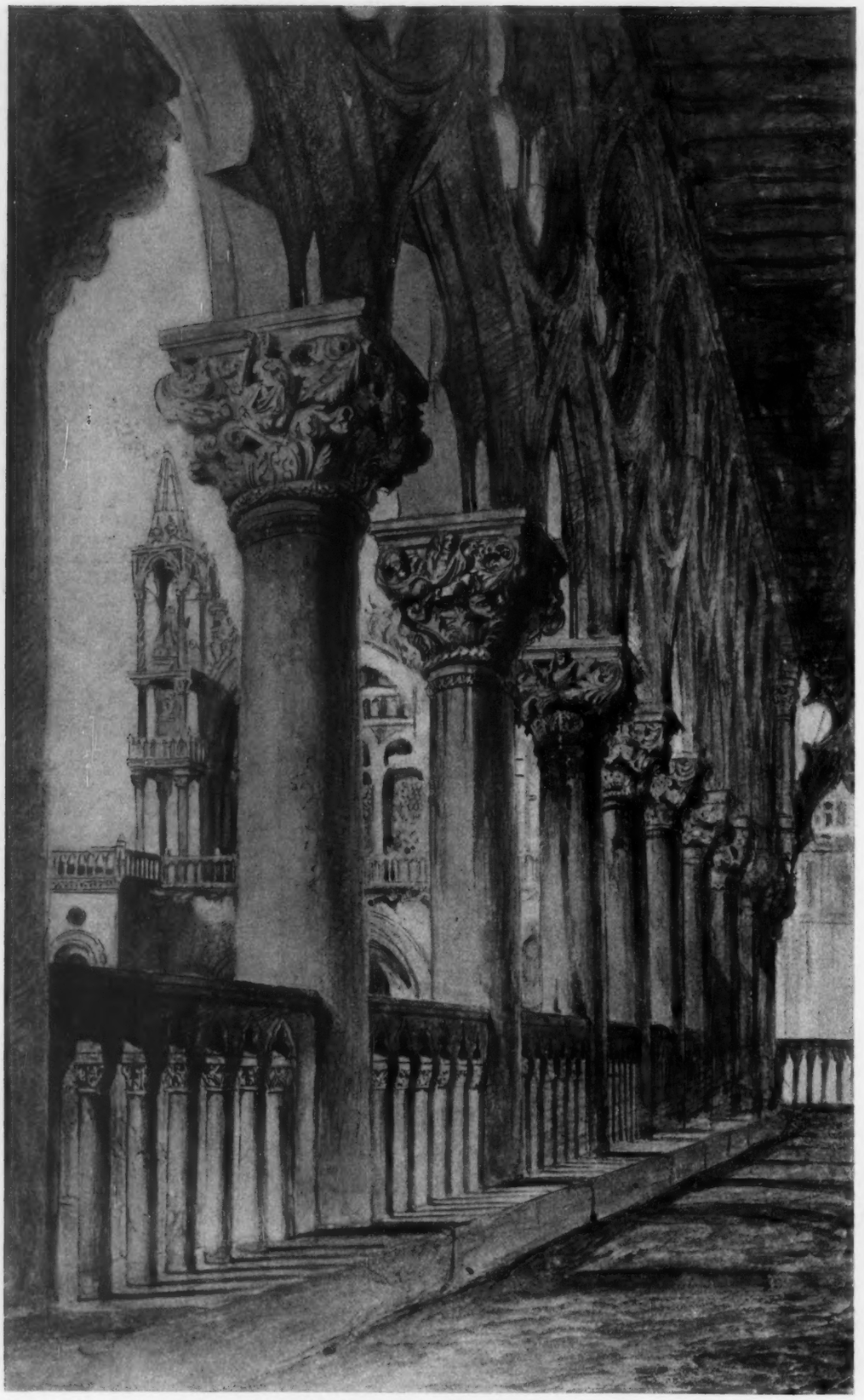
6

THUMB-NAIL SKETCHES BY GEORGE NELSON SHOWN AT EXACT SIZE

1 and 2, Studies of pattern in etchings by Brangwyn—a very good thing to do occasionally; 3, Study for a water color, Church, Granada; 4, A careful study with slight suggestion of detail; 5, An experiment in forms and values; 6, Study drawn carefully but at small size.

sketches. Ruskin on this all-important point has something to say, in his comparison between Reynolds and Hobbema: "A few strokes of the pencil, or dashes of color, will be enough to enable the imagination to conceive a tree; and in those dashes of color Sir Joshua Reynolds would have rested, and would have suffered the imagination to paint what more it liked for itself, and grow oaks, or olives, or apples out of the dashes of color at its leisure. On the other hand, Hobbema . . . . smites the imagination on the mouth, and bids it be silent, while he sets to work to paint his oak of the right green."

MISCELLANEOUS THUMB-NAIL STUDIES BY GEORGE NELSON



Courtesy Metropolitan Museum of Art, New York

FROM A PENCIL AND WATER COLOR DRAWING BY JOHN RUSKIN

LOGGIA OF THE DUCAL PALACE, VENICE

More Anent the Stair Rule

As Criticized Last January in Pencil Points

By George Eichenlaub

Since the Pennsylvania State Code of Regulations with regard to Stairways seems to be based in large measure on certain STANDARDS that appeared in the *National Safety News* for February, 1927, as published by The National Safety Council, it may be profitable to examine that work—especially since the Council has done much good and might be regarded in some measure as authority (which reacts to add danger to any statement if it be not fully correct).

This article, which is by Mr. H. W. Mowery, is illustrated with a convincing graph, reproduced on page 12, bearing a title "APPROVED STANDARD, Workmen's Compensation Service Bureau," which again has the earmarks of authority. In a word, it appears as though any Architect or Engineer could now discard his older rules or notions, paste the article up in the drafting room and let all and sundry be guided thereby; an easy way to settle all argument or doubt and forget that for more important or lucrative activities.

GEORGE EICHENLAUB

The graph is based on a 17½" sum of run and riser rule. Various combinations of rise and run with angle of pitch are handily worked out in the column to the right. Now it will be noted that the graph is evidently intended for use in design of *any* stairway. It is short, concise, and universal, a very good point in its favor, if true or possible. Since I, however, have found no short-cut rule or answer after measuring some two hundred seventy stairways, it is natural for me to conclude that this graph is another attempt at a satisfactory answer—but not a conclusively final one.

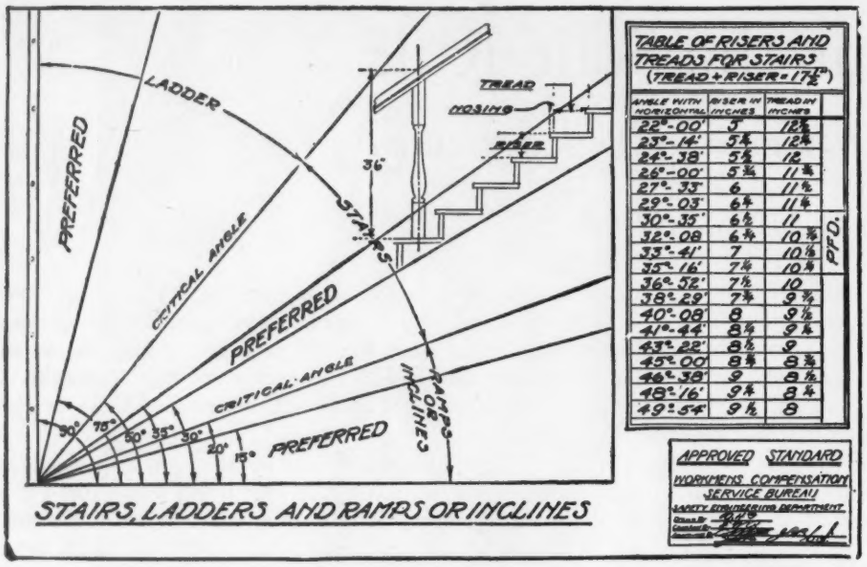
So far, it is my thought that Stairways fall into "Several" classifications the requirements of which all differ. Broadly, they are Public, Semipublic, Private, Industrial, and Activital (where we have motion as on a ship, or visual movement as active machinery). These, in turn, are all again split into Interior and Exterior or exposed conditions, each further influenced by the width of the stair, its position in the plan, materials and colors used and type of nosing, if any. Emergency Exit Stairways would be another classification, but will not be covered here, except by saying that we think the section on "School Stairs" may be closest to the ultimate answer to this question.

Solve all this in one short rule, regulation or graph and we at once have a masterful disposition of the matter that should compare with the ultimatum of a Mussolini or a Bolshevik dictator. Well—a good job anyway.

"It can't be done" has no place in our scheme of things, but no attempt is here being made just yet to work out such an universal rule. Some reader may attempt it and welcome; we surely are much interested. The State of Pennsylvania, however, has not been deterred. The new Theatre Code, as published, is before me and blithely states in effect that "Stairways shall not exceed 17½" in the sum of rise plus run and shall lie within limits of pitch at 33 and 36 degrees and stairs over 8'-0" wide shall have an intermediate handrailing." The State also has, for early release, a like or similar ruling to apply on all new public, semipublic, and industrial work. Now, we are asking the reader again to write the Department of Labor and Industry at Harrisburg, Pennsylvania, in protest. Very many *must* do this or the State will think it unimportant.

So much better if you will check up by measuring a few stairways that seem best and safest; you will learn much at small expense of time, equipment, and effort; only four measurements and you are in possession of good information of lifelong value. All that is needed is the rise, the run, the tread, and the width of stairway—then a note on color, material, nosing, and classified use. Then figure it up and get a surprise. If you drop me a line on your reaction or a copy of your Harrisburg letter, it may help toward the evolution of a rule—perhaps.

Getting back to the original thesis, the first graph, called "Approved Standard," shows "'Preferred' Pitch of 32, 33, and 35 degrees, 17½" sum, with riser-run ratios of 6¾" x 10¾", 7" x 10½", and 7¼" x 10¼" respectively." The graph shows at a glance that in Pennsylvania you are hereafter limited to 7" x 10½" and 7¼" x 10¼" or proportionately less as governed by the pitch. Now let us consult the Eichenlaub Graphs shown herewith and see how we all check up.



GRAPH NUMBER 1—APPROVED STANDARD FOR STAIRS AND RAMPS
PREPARED BY THE WORKMEN'S COMPENSATION BUREAU

After some hours of study, we have selected a few graphs of Public Interior Stairways. Though we make an effort to be lucid and simple, we quickly find the matter on file so complicated and even contradictory that the task is extremely difficult. (To think that lawmakers are not often deterred by such mere considerations!)

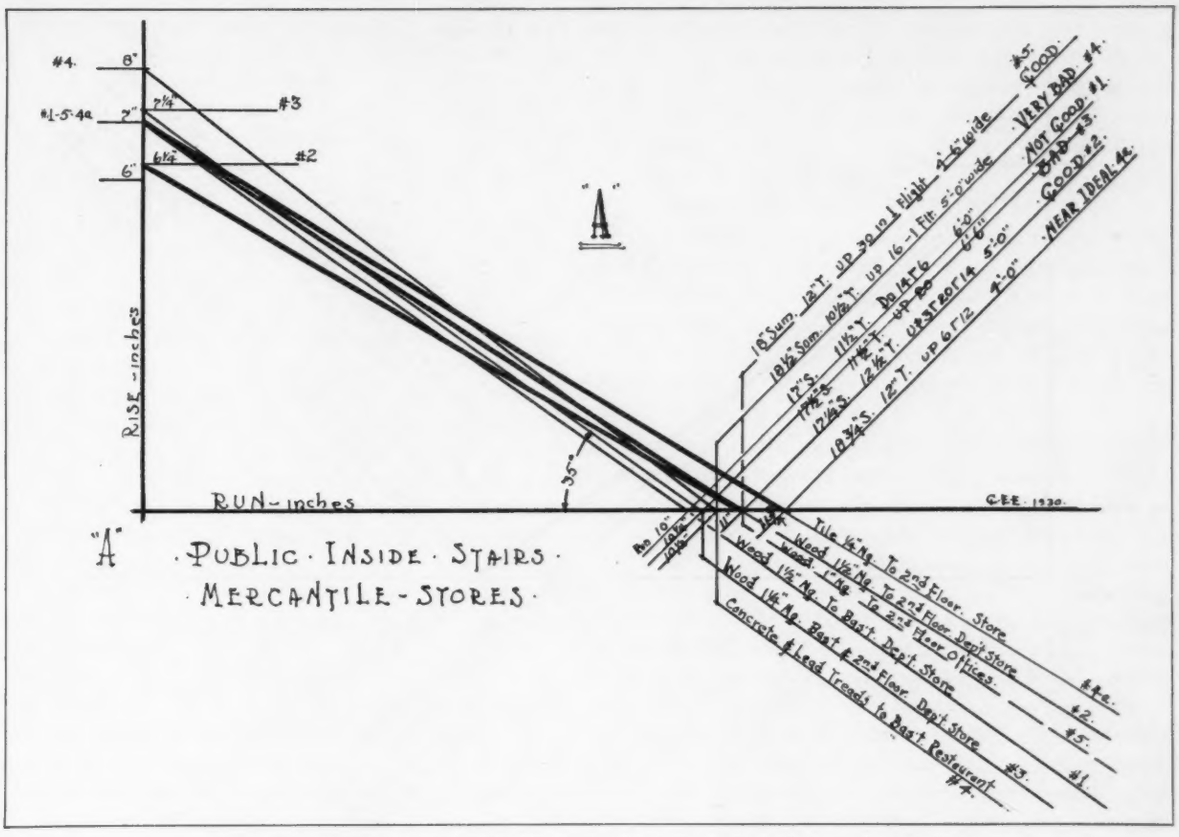
But let us worry along. On our graph, *A-3* design shows an "Approved Standard Preferred" (G-1) and also "Pennsylvania Legal" stairway at 7¼" x 10¼" and 35 degrees pitch. Four of such legal and preferred stairs are found (same graph "A") in a commercial building and department store of importance built in 1914. The stairs vary in width from 5'-0" to 6'-6" and flights vary from 8 to 20 steps. It is only fair to note that all treads are covered with new checkered rubber and have corrugated 1/16" thick brass edging to stop rubber from curling at the step-edges, which is hazardous any time. All these stairs are rated by us: "Stiff, ungainly, tiresome. All are bad, but hardly dangerous; too much rise or not enough run. Golden oak finish; good natural light; 1¼" nosing. A general stiff and square appearance and length of flights may help toward the bad mark given these stairs."

In the same graph, *A-4a* is 7" x 11¾", not in accord with "Legal or Standard," and is marked IDEAL—and with only a ¼" nosing too. But it is again only fair to say that the first flight as referred to has only six steps and the approach is a right turn so that no one can attempt this stair at fast or running speed. Then the *A-5* is 7" x 11" x 1" = 12" tread, 30 in one flight, 4'-6" wide, and is nearly good. The same stairway without tread coverings and with shorter flights, as exposed in *5a*, is a distinctly good stairway although not in accord with "Approved Standard" or "Pennsylvania Law."

In graph *B* we find a group of stairs evidently governed by the 17½" rule. The *B-7* design is also 7¼" x 10¼", the same as the *A-3* design spoken of. This stair is narrower, is steel composite construction with white marble treads and 1½" nosings, has shorter flights, and is labeled "Very Good," with consideration for its purpose as "Auxiliary to Elevators." Note that both *A-3*, marked "Not Good," and *B-7*, marked "Very Good," though apparently the same, differ in materials, color, and use. Turning to graph *C*, in the *2*, *3*, and *6* designs from a school by William B. Ittner, we see no agreement with or undue influence by any rule and yet find two IDEAL and one VERY GOOD. Consulting the graphs shown in the January, 1930, issue of PENCIL POINTS we find more material for good comparison and judgment, which again does not lead to any reconciliation with the "Approved Standard" or any other rule so far proposed.

Now, to confound the reader further, let me cite this page from concrete experience. In 1913, the author had to design a stair leading to the mezzanine offices of a piano business establishment where hundreds of all manner of people came to pay their weekly dole on furniture purchased. They were mainly women, old and young, and usually in groups of two or more. The stairway was of wood and built as 6½" x 11" x 1¼" = 12¼" treads, the limit of the 17½" sum rule; up 14 in one flight and 3'-6" wide; no tread coverings used. One side was open to the store and equipped with a light "Banister." The stair was finished in white with mahogany treads and railing-cap. This stair proved "*unusually good*" for its purpose. Now the sum is 17½" and the pitch 30 degrees which is within the "Approved Standard Preferred" limit, but lies outside the Pennsylvania State requirements. Does this prove anything? Let us see.

In 1926, this same stairway was sawed to a width of 2'-9" and placed in the rear of the same store leading to the same mezzanine now converted to be used for a private office and for the storage or packing space of a small jewelry business. Note that the use is now quite different and the stair much reduced in width—same railing, open one side as before, and the identical stairway in so far as rise and run are concerned. And —it now rates as "*Not so good*; too easy in pitch and riser height for the purpose served." Therefore, it is evident that the same rule cannot apply in both "conditions of use," because even the same identical stair does not fit two conditions—in the Public case

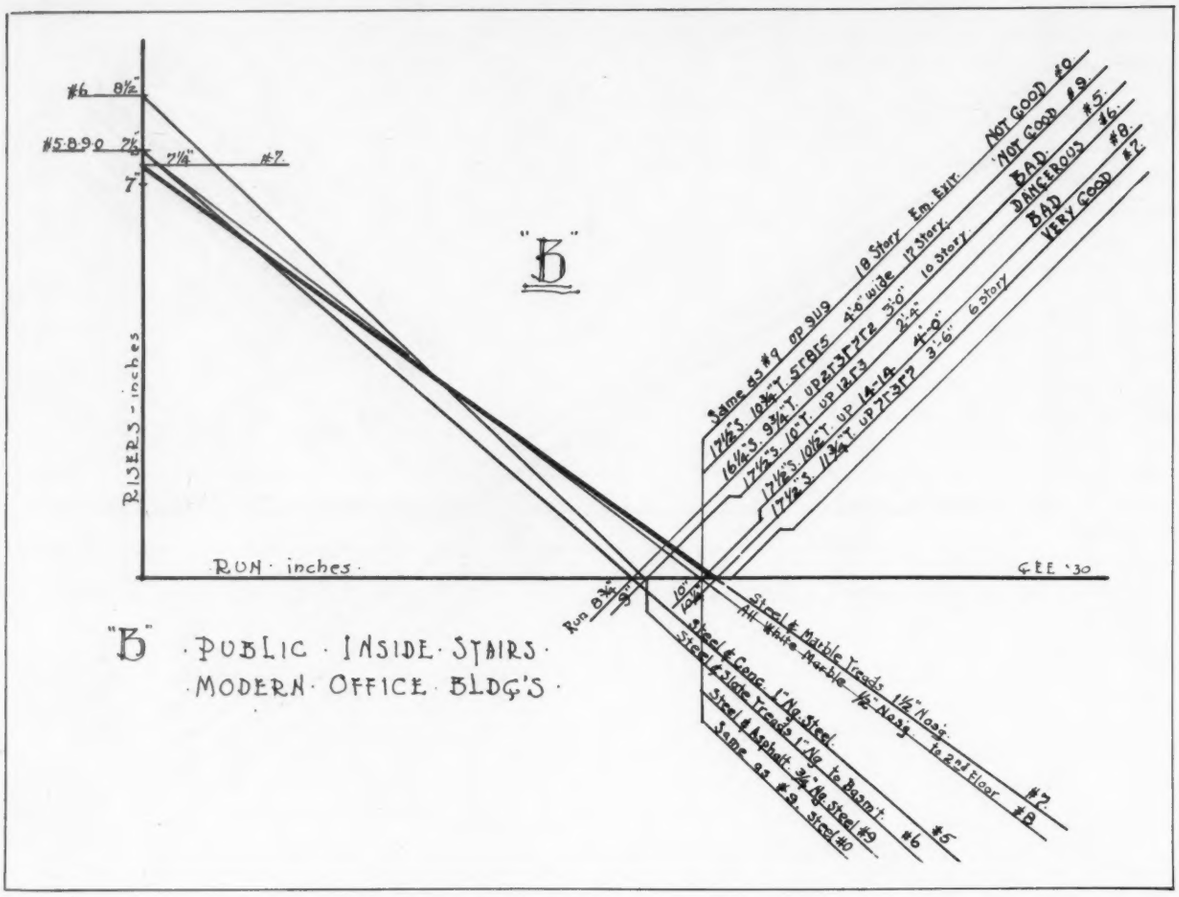


GRAPH A—GRAPHIC ANALYSIS BY GEORGE EICHENLAUB OF EXISTING STAIRS

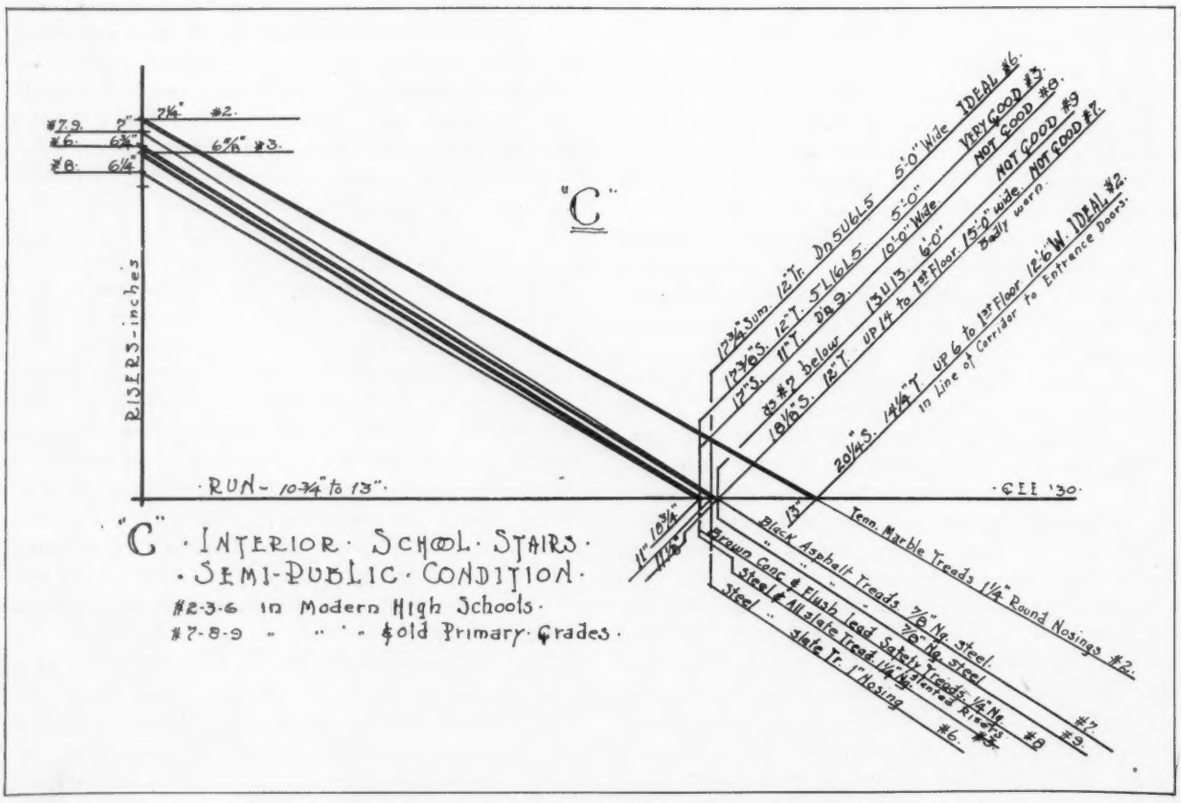
being "Near Ideal" and then "Not so Good" for the Private and the Industrial Condition.

Just one more page from experience. In the year 1900, my honored daddy built him a house—one of the finest in the city for that day. For the first time I heard talk about the Stairbuilder—his skill, his art, his specialty which marked him as a craftsman apart. (Indeed, it were well to humor him some, even as one should the Architect.) It became known that our stairway was going to be one of supreme merit and quality, one of the finest. Mr. Althof, himself and no other, was to do this job and was duly engaged. In due course, this square open stairway in the square main hall took shape in all the glory of its quarter-sawed oak, turned spindles, goosenecked rails, newels and urn-shaped finials of thin and carved—Golden Oak. And many came who admired the job. As for me, I was too young to know real beauty and now, methinks, perhaps I am too old. Be that as it may, the fact is this: that stairway to me, as a youth, was stiff, ungainly, tiresome in use and actually near dangerous—and long before design or dimensions meant a thing to me. Witness this; within one year, no less than two of the beautiful (?) urn-finials had been pulled off by stumblers and had to be replaced. Certainly, my father's family and guests always had good beer and ale, but I maintain this would make no difference if the stair had been truly right. In the last January issue we spoke of a stair that was truly right, one that had come through unbroken since 1802 and for a long time had been used in an hotel where a bar and really "strong stuff" was a "business." Checking further against my father's house, the mother, brother, and others were lately and specially interrogated and, in fine, also agree that something was not just exactly right, though they could not say just what it might be. Therefore, my rating sticks "Not so good." And time passed—until in 1922 this now practicing architect took the father's house over, trimmed off the rotting "gingerbread" and converted the home into a two-family apartment. The lower flight of stairs was pried loose and swung around against the west wall, the railings were broken down and walls took their place. The width of the stair was unchanged, rise and run remained as was, even the golden oak was retained and brightened up with new varnish (I didn't have to live there any more), and the job was done and has been continuously occupied since at a good rental. Imagine my surprise though, to find that this stairway had now become a remarkably *good* stairway. Now it earns a mark of "Very good." It measures 7¼" x 10" x 1½" = 11½" tread, 3'-6" wide, and is now a 12-step flight, right (L) turn landing and a 7-step flight to the second floor; no wall rails used and none required; no tread coverings.

Some one may discern that in both the above cited instances, when the other architect did the job we mark it minus and as soon as this architect gets there and moves the stairway—presto! it immediately becomes "Good." Well—that occurred to me too, so I got me some good cigars and a best smile and ap-


"B"
RISERS - inches
RUN - inches
GEE '30
#6 8½"
#5 8 9 0 7½"
7¼"
#7
7"
Same as #9 or 8½ 18 Story Ext. Exit. NOT GOOD #10
17½"S. 10¾"T. 5 Flights 4'-6" wide 17 Story NOT GOOD #9
16½"S. 9¾"T. up 2 Flights 3'-0" 10 Story BAD #5
17½"S. 10"T. up 14 Flights 2'-4" DANGEROUS #6
17½"S. 10½"T. up 14 Flights 4'-0" BAD #8
17½"S. 11¾"T. up 21 Flights 3'-6" 6 Story VERY GOOD #7
Run 8¾"
9"
10"
14½"
Steel & Marble Treads 1½" Nosg. All White Marble ½" Nosg. to 2nd Floor #7
Steel & Conc. 1" Ng Steel #8
Steel & Slate Treads 1" Ng to Bsmt. #5
Steel & Asphalt ¾" Ng Steel #9 #6
Same as #9, Steel #10
"B" · PUBLIC · INSIDE · STAIRS ·
· MODERN · OFFICE · BLDG'S ·

GRAPH B—GRAPHIC ANALYSIS OF STAIRS IN MODERN OFFICE BUILDINGS


"C"
RISERS - inches
RUN - 10¾" to 13"
GEE '30
#7 8 9 7" 7¼" #2
#6 6¾" 6⅝" #3
#8 6¼"
17¾"Sum. 12"Tr. Dn 5 6 4 5 5'-0" Wide IDEAL #6
17-3 0"S. 12"T. 5 Flights 5'-0" VERY GOOD #3
12"S. 11"T. Dn 2 Flights 10'-0" Wide NOT GOOD #8
as #2 below 13 Flights 6'-0" NOT GOOD #9
18½"S. 12"T. up 14 to 1st Floor 15'-0" wide NOT GOOD #7
Dally worn.
20¼"S. 14¼"T. up 6 to 1st Floor 12'-6" W. IDEAL #2.
In Line of Corridor to Entrance Doors.
13"
11" 10¾"
11¾"
Terra. Marble Treads 1¼" Round Nosings #2.
Black Asphalt Treads ⅞" Ng. Steel.
Brown Conc. & Flush Lead Safety Treads ½" Ng. Steel #7
Steel & Alsiate Tread 1¼" Slanted Risers #8
Steel " Slate Tr. 1" Nosing #6 #9
"C" · INTERIOR · SCHOOL · STAIRS ·
· SEMI-PUBLIC · CONDITION ·
#2-3-6 in Modern High Schools ·
#7-8-9 - " " - & old Primary Grades ·

GRAPH C—GEORGE EICHENLAUB'S ANALYSIS OF SCHOOL STAIRS

proached the first twenty-five passers-by regardless of age, sex, or appearance. From these I got nineteen to pause in some doubt, mount the stairs, come down, and then return at greater speed without putting down their bundles, if any. Thereupon I questioned them negatively something like this: "Why are those steps so uncomfortable?" "Would it not be a good idea to have a law or ordinance compelling people to put in better stairs?" The concensus of opinion was "Those steps are not uncomfortable," and I could not shake them on that either. Instead they mainly wished their own stairways were "half so good" and so on. In fact, we rented the upper flat to one of those ladies who was something of a crank on stairways herself. Most of the people thought "a law would be a good thing," but since this is something of a common American trait, we attach no importance to that; some day we Americans will be fed up on this law business.

My deduction and rating "Very good" is really gained from these people and not from mineself, but I do urge that we must not have a law about it until such time at least when we generally KNOW more about the subject.

The stairs shown in the graphs so far include the work of George B. Post, William B. Ittner, Arnold Brunner, Alden & Harlowe, Dennison & Hirons, etc., none of whom need any introduction here. We have a right to suppose if they say a thing is right, the argument is about settled—but such is far from the case. It merely proves to us that "Good and Final Stairway Information" is not such a common and settled commodity as we have all of us pretty much supposed, including the best known firms, as noted above, in the profession.

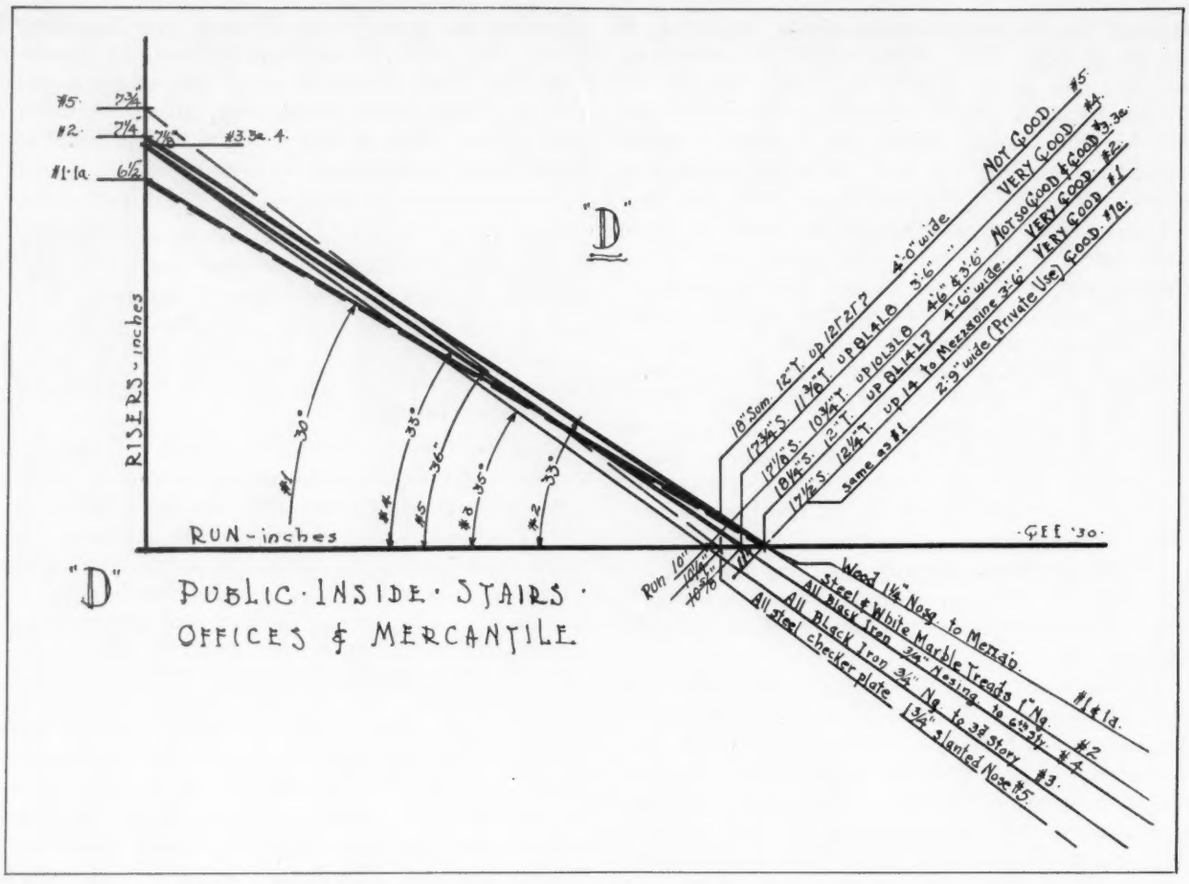
Coming back to the *National Safety News* article, Mr. Mowery does not fully agree with the No. 1 "Approved Standard" graph either, for he proposes another rule, to wit: "The best formula for determining tread and riser dimension is: 25″ minus tread width over-all divided by two equals the riser height. The angle is preferably between 30 and 36 degrees with the horizontal." Space does not permit further analysis here, but this rule, too, will not be found to work out or check with our graphs and experience or with opinions cited by this author. Mr. Mowery then uncovers the first word we have so far seen or heard concerning the influence of "Materials" upon stairway design, for safety and comfort. I maintain here that these two last elements of safety and comfort are closely synonymous or equal to each other. His words are in full agreement with my thought, so I use his: "Any slippery material is unsafe or subnormal; marble, slate, wood, etc., are normal, but may be unsafe when damp or wet; cork, travertine, asphalt mastic, ribbed rubber, and anti-slip materials as abrasive safety treads (Mowery sells 'em) are supernormal or safe and the best to use." He says further "Handrails should be used on both sides of stairs over 3′-0″ wide and an intermediate railing on stairs over 8′-0″ wide." The State of Pennsylvania says the same thing in nearly the same way and, I opine, copied this data, simply taking it for granted. Now, while we agree with the above by Mr. Mowery, he says nothing about color, or about architecture—meaning appearance—and when we started out on this voyage it was with the same purely engineering, safety, or utility point of view, which is now found to be insufficient to explain some characteristics we have found.

Some School Stairs: See Graph *C*

In a grade school I ran into this curious combination of stairs (I incline to term this "semipublic use," since the scholars live here a goodly portion of their waking time and so can and do accustom themselves to the conditions as found), done about 1914 by a politician architect who is now exclusively and better engaged as a politician.

Graph *C-7* design shows the condition. The stair was built of composite steel, painted black and black-grey, with asphalt-mastic filled treads, a width of 15′-0″ between walls, no intermediate handrails, one flight of 14 steps in the corridor to double doors with a clear opening of 6′-0″—a beautiful "bottle-neck" if you ask me. On entering the door and first glancing at this black forbidding prospect, with the head of the stair above my eye-line, the apparent pitch and general appearance were such and the negative reaction in myself so pronounced, that instinctively the job was marked "Bad" even before measurements were made. Then, carefully—a walk up and down—and again up and down at greater speed, and finally the conclusion that something must be wrong with me. Possibly this new "Stair-legitis" was setting in so that any old stair was become a good stair to me. Again up, and again down, but it still remained not quite a "good" stair—not so bad as I first thought, true, but still not good. Then it was measured and imagine my great surprise to find that the rise and run were just about what I would say was "durn good," 7″ x 11″ x 1″ = 12″ treads. True, the nosing had only 1″ projection, the slippery steel nosing edge was dangerous, and the width of stair was excessive without handrails—but, even so, the user should have a better opinion in his mind. The figures were 7″ x 11″ and no mistake; what could the trouble be? And now this engineer came to a most enlightening conclusion; perhaps after all, architecture as such—mere good appearance as color, line, etc.—has its place of positive importance in the practical application of methods for better safety and the "Safeguarding of Life, Health and Property"—a stated prime purpose for the Pennsylvania regulation, which is apparently wholly ignored by all lawyers.

Puzzled and thinking, my way continued to another grade school where I found a brand-new, to me, type of stairway built about 1924. Graph *C-8* shows this design. It was of a light brown magnesite concrete with mason-type safety treads 4″ face, level and nicely placed in the outer edge of each tread, designed as 6¼″ x 10¾″ x ¼″ = 11″ treads. The shiny top of the 4″ lead treads offered splendid contrast to the brown of the concrete for visibility in use; the steps measured only ½″ short of the 17½″ sum as shown in the "Approved Standard" graph. While these


"D"
RISERS - inches
RUN - inches
#1 30°
#4 33°
#5 36°
#3 35°
#2 33°
#5 7¾"
#2 7¼"
#1-1a 6½"
#3.3a.4
"D" PUBLIC · INSIDE · STAIRS · OFFICES & MERCANTILE
GEE '30
Not Good #5
Very Good #4
Not so Good & Good #3.3a
Very Good #2
Very Good #1
Same as #1
Wood 1⅛" Nosg. to Mezzan. #1 & 1a.
Steel & White Marble Treads 1" Ng. #2
All Black Iron 3¼" Nosing to 6th Sty. #4
All Black Iron 3¼" Nosing to 3d Story #3
All Steel checker plate 3¼" slanted Nose #5

GRAPH D—PUBLIC INSIDE STAIRS IN OFFICES AND MERCANTILE BUILDINGS

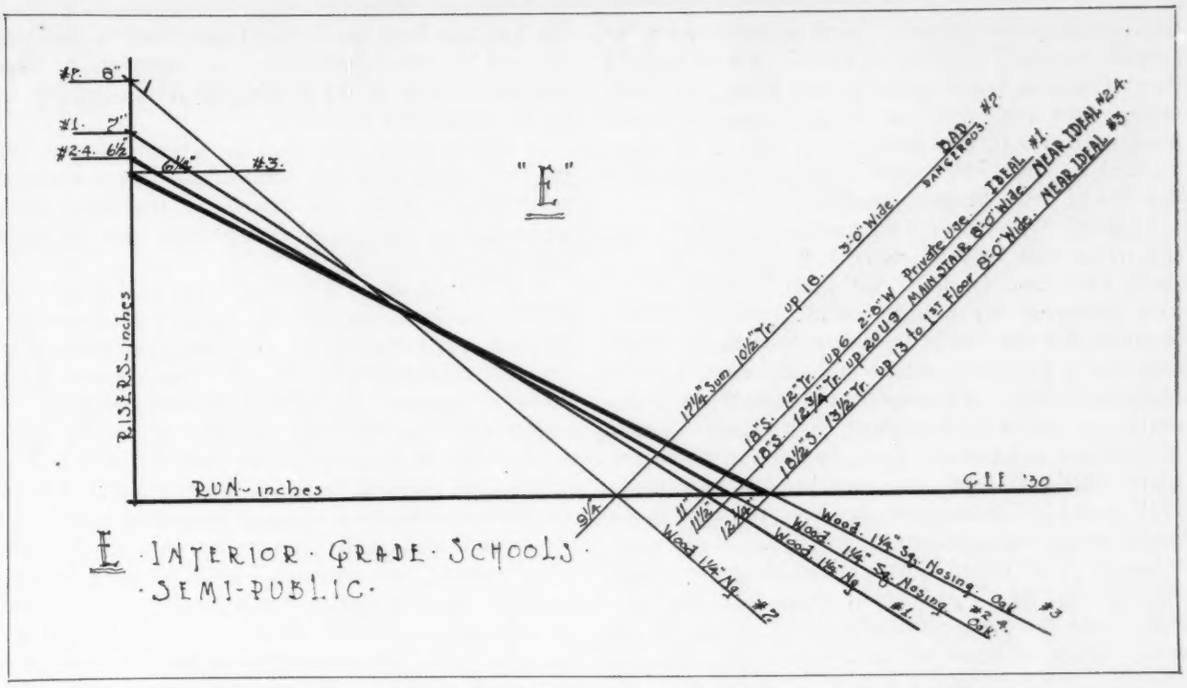
steps were placed in the straight line of the main corridor travel, near its center of length where the steps could not possibly be avoided, and were 10′-0″ wide without handrails in one flight of nine steps and deficient in nosing—still one would be almost compelled to think these stairs infinitely better and superior to the ugly black flight just previously cited. And such was my first personal reaction, due to this good appearance alone, although my stride seemed somewhat restricted in the use of the said stairs.

Now for a check-up and investigation to discover if possible, as Uncle John, an old attorney, says, "if the truth lies." The children did not think so badly of the black and worn steps with their trippy steel nosings that I had mentally condemned, but have now marked "Good" on the strength of their say-so. The last are marked "Not Good" for the same account. Even candy could not shake the opinion of my own kids, aged 7, 9, and 11 respectively, that these last-named were not at least fairly good. They say they trip, insist they trip, must always be oh, so careful, and distinctly have a vehement aversion to the last-named 6¼″ x 10¾″ stair. Evidently good appearance alone does not have great influence on the child-mind when we consider steps. After several years of use, the children have rendered their verdict and I conclude that these two stairways lie near the end-limits of school-stairs practice regardless of law, rule, or regulation.

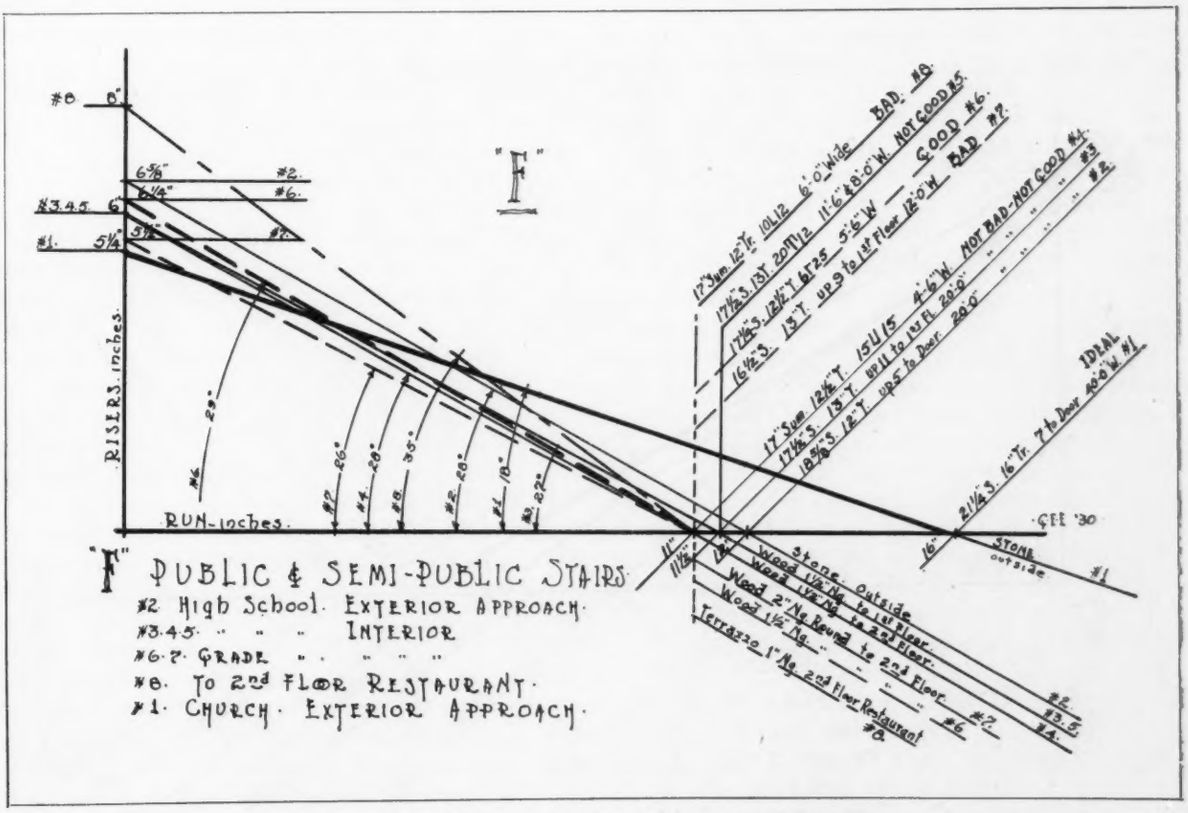
Again I come back to our 7″ x 11″ starting point for design and here I would use seven minus and eleven plus to design about a 6¾″ x 11½″ x 2″ = 13½″ tread. None just like that are found, but it approaches the IDEAL Public Library Stair in fine white marble that was shown in last January's article in PENCIL POINTS.

Public Schools and their stairways probably receive the maximum of interfloor travel. It is almost fascinating to stand clear and observe the whirl and rush and variety in use of such stairs when the gongs ring the classes in and out. The same graph "C" shows some excellent stairways in a high school by Mr. Ittner, which are not in accord with any rules—and now let us investigate further.

Graph *E-2, 3,* and *4* designs are from an older school built in 1899 by the late Joseph Frank, a German-trained architect who thought much of his scrolls and "durmelee" in common with those of his day, but who surely knew his stairways, as we shall see. The three stairways are near IDEAL and are found as 6½″ x 11½″ x 1¼″ = 12¾″ treads for an average; they are of good oak without tread coverings, 8′-0″ wide and have no trick-railings such as are found in more recent schools. In all the years, numbering thirty in use, these stairs have caused no accidents that inquiry could discover. The children like these stairs and I can personally vouch that they are just fine, because, as a youngster of 14, I attended



GRAPH E—GEORGE EICHENLAUB'S ANALYSIS OF GRADE SCHOOL STAIRS



GRAPH F—MORE GRAPHS FOR PUBLIC AND SEMIPUBLIC STAIRWAYS

this newest public school. If these risers were increased from 6½″ to 6¾″ or even 7″ it is my opinion that the stairs as found would be even better, and if the nosing were made 1½″ or 2″ projection the added tread width would help design *2*. I have doubt about *3* which is now 13½″ tread, although without question its 6¼″ riser height is insufficient.

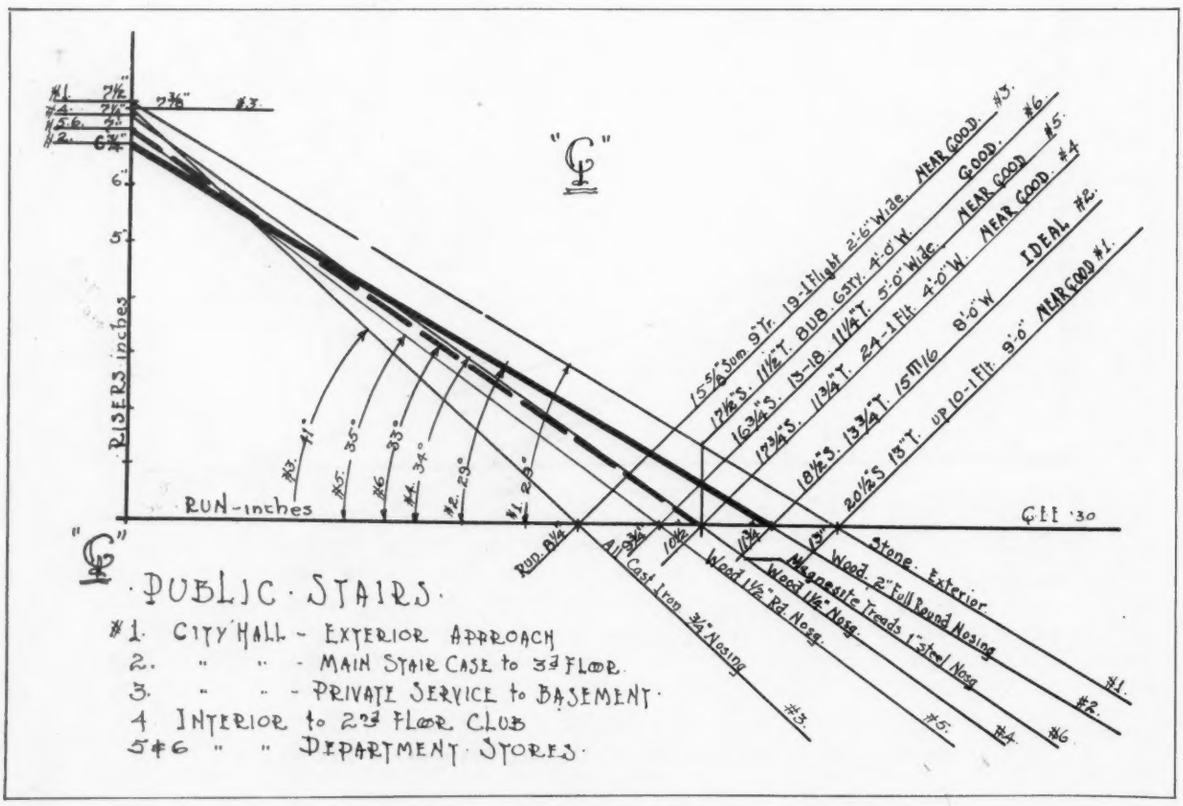
In graph *F-3, 4,* and *5* we find similar construction and treads with only 6″ risers, built in the same city about 1890 and labeled "Not good." This would seem to support my ratings and ideas too, for it will be noted that the sum of the latter, now that it is figured up, is 17½″ in accord with the now, I hope, condemned Rule. The experience of either the architect or of the Board here must have shown the stair with 6″ rise to be not so good, and in the subsequent job of 1899, as cited, the riser heights were made 6¼″ and 6½″ which we also have rated as much better, though still not quite "Ideal."

Graph *G-2* design finally does show one stair marked "IDEAL." It is not in a school, but in a City Hall where the use is public, but much akin to school use. It is also of wood and has the same general characteristics, but is measured at 6¾″ x 11¾″ x 2″ = 13¾″ treads and is ideal in spite of its shiny, flat cast-brass and potentially hazardous all-over tread coverings. I am much pleased to mention that this about bears out the recommendations just made regarding improvement of school stairs. Of course, if this had not been so, I might have had to rub this out and rewrite. Since it is so, however, it helps strengthen belief in our graphs and also in opinions so far developed and expressed.

It may be noted now, that the school stairways are generally wider than the commercial ones as exposed in the graphs *A, B,* and *D* and that the school stairs are somewhat easier in general pitch to gain the same mark of goodness.

I now think that the angle of pitch in degrees is of relative unimportance, since the rise and run determine the pitch and if they be correct it naturally follows that the pitch must be right, too. To describe and show pitches in degrees only tends to complicate further a subject that should be very simple, but has not been so found up to this time. The pitch therefore is left off on some and will be on all future graphs. I hope law-making bodies will also try for this simplification. I also still feel, with growing conviction, that the 17½″ sum of riser and run, instead of being a limit, should lie near the center of any requirements or used as a starting point for the designer. In new design we like our 7″ x 11″ better as the intermediate mean, the stairs to be somewhat steeper for private or residential work and somewhat flatter for public work in general.

NOTE:—*Next month Mr. Eichenlaub will discuss other classifications of stairways such as Private, Activital, etc., in an article of the same approximate length, which will show how requirements do vary.*



"G"

PUBLIC STAIRS.

#1. CITY HALL - EXTERIOR APPROACH
2. " " - MAIN STAIR CASE to 3rd FLOOR
3. " " - PRIVATE SERVICE to BASEMENT
4 INTERIOR to 2nd FLOOR CLUB
5 #6 " " DEPARTMENT STORES

GRAPH G—GRAPHIC STAIR ANALYSIS BY GEORGE EICHENLAUB

The Pyramider

An Architectural Story

As Told to W. B. Warner by R. W. Meadows, Architect

A young architect, handling his first court house contract, would hardly expect to have the experiences pile up on him in the manner that fell to my lot when, at the age of twenty-nine, I found myself in charge of such an operation. It was in the third year of my independent practice in the city of D . . . . . , in the Middle West. The pretentious structure I had undertaken to produce was to be erected in R . . . . . City, a county-seat town about a hundred miles distant.

The five members of the county board included four Scandinavian Republicans and an astute Irish Democrat, all farmers. The personnel of the Republican group varied from one election to another, but, although the county was overwhelmingly of that persuasion, yet honest old Denny Malloy was returned unanimously every two years, and had been chairman of the board for at least twelve. Some said it was because the "Scandies" couldn't trust each other, but they all knew they could trust Denny.

That the chairman ran things to suit himself was evidenced in his selecting me for the architectural service, over the heads of many applicants of more experience—simply because he knew my father. A ring of crooked architects and contractors was said to be operating in connection with public buildings in that vicinity, hence Denny proposed, first, to employ a man they could trust. Then, if he happened to provide them with a building of the right kind, so much the better.

Naturally, I had heard something of the deals that had been pulled off, but I knew that they could only be worked with difficulty without the connivance of the architect and at least one strong board member. Working with "Honest old Denny," I felt fairly safe.

To be sure, I had, to begin with, the usual difficulty of "cutting the cloth to fit the pattern." The original appropriation was $150,000, and several of my overly-sharp competitors had eagerly offered to "guarantee" that they could produce the desired building for the money. But I had helped the county attorney to demonstrate to Denny's satisfaction the worthlessness of such "guaranty," based only upon incomplete sketches, without specifications.

After I had been employed, Denny admitted that the board was more interested in knowing that their funds were neither wasted nor stolen than they were in holding the architect and contractors strictly to the appropriation. I therefore made a careful survey of requirements and planned accordingly, and Denny seemed not at all worried when I told him my building would cost about $175,000.

My first setback came when, at the opening of the bids, we found ourselves with only two on hand, and no others promised. Seven other contractors had returned the blueprints and specifications under various pretexts. One bid came to $185,000 and the other to $195,000. We rejected them and readvertised. I made a few minor changes in the specifications, but Denny assured me it wasn't necessary to get a price within my estimate, just only to be sure that they were having real competition.

Apparently, they had it the second time, for the bids ranged from about $174,900 up to $192,500. Strangely enough, the man who had bid high the first time, Jim Perry, was now low. The former low bidder, Judson, had come down $6,500 in consideration of my changes, which I deemed about right; but I could not understand how Perry could cut his price by $20,100. I learned from Judson, who was not in the "ring," that he had thought, because I had broken into their game, that he might do likewise; but they had been too shrewd for him. It was his opinion that none of the others had figured the job, but submitted figures as directed by Perry, who had learned from Malloy the price I had estimated, and had merely bid accordingly. Judson assured me that I would have my hands full. He proved a true prophet.

Now, it happened that Perry, who operated under the name of the Dependable Building Corporation, had once been a general contractor in my own town (under his own name); had failed under circumstances not to his credit, and had betaken himself to new fields; hence the incorporation. Before the contract was awarded, I therefore told Denny that I didn't consider the low bidder as "dependable" as its name implied, and advised sending out a committee to investigate some of the work it was doing. He agreed to this and appointed me a committee of one for the purpose. I demurred on the grounds that my prejudice might render me unfair. But they sent me, nevertheless, saying I would know best what to look for.

I visited, in different places, a court house, a city hall, and a high school, all under construction, and a public library, just completed. In each case, I found the architect and the owners' representatives well pleased with the work of the Dependable Building Corp. Oddly enough, I was told, in each instance, that the company was doing excellent work in spite of the fact that it must be losing money on the contract. In the case of the library, Perry was said to have admitted that he "had gone down in his pockets" to make up a $10,000 shortage on his $80,000 contract. It was also rumored that he had lost money on a

schoolhouse, the only other work so far completed by the new corporation.

However, having received no adverse criticism of the company's operations, I was constrained to withdraw my objection, and the contract was accordingly awarded to Perry, conditioned upon the deposit of an approved surety company bond, which was duly forthcoming. Could I have divined the clever machinations of the unscrupulous "pyramider," as I came to understand them later, my embargo would most certainly have stood—and I would have been saved a deal of trouble.

Perry's general foremen were the best he could find, always; instructed to do whatever the architect demanded, so I experienced no trouble from that source. This left the "general manager and purchasing agent" of the Dependable Building Corp. free to devote his own time to closing new contracts and awarding his "subs." In both of these functions, his system was nearly perfect, as we shall see. The thing that beat him was the weather. To be sure, his Nemesis had to overtake him sooner or later; but he had not foreseen the long, cold winter that closed in on him before he was quite ready to quit. He might have gotten the other half of his million.

After five months of smooth sailing on our court house, I was congratulating myself upon my good fortune in having the work so well handled. My only friction with Perry was a regular monthly quarrel over his payments on account, the which he could collect from the county only on the certificates of the architect. These were never large enough to satisfy him. He was the smoothest salesman I have ever encountered, and nothing but my positive knowledge of the man's true character saved me from falling for his assiduous "courtship."

As a basis for my monthly estimates of work done and materials supplied, he filled what purported to be a detailed statement of what the building would cost. Compared with a similar statement of my own compilation, only his total agreed. His "estimates" of excavating, concrete work, steel, and other items at the beginning of the job were nearly double mine, whereas such matters as cabinet work, painting, decorating, and hardware were ridiculously low. Had I permitted myself to be led by him, he would have drawn nearly one-half his contract price before the job was one-fourth done.

The friction between us on this score increased from month to month and was brought to an *impasse* on the first of December when I intimated to him that I would issue no further certificates until I had evidence that he was paying his bills on our work. Public buildings (in that state, at least) are immune from ordinary mechanics' liens, hence Perry claimed that the conduct of his affair was none of my business, regardless of what the contract said on the subject, so long as his creditors were not complaining. At this time, he had received about $40,000 on account, but all that I could find that he had paid out on our job had been for local labor and freight bills, not to exceed $5,000. Apparently, neither the excavating contractor nor any of the local supply houses among whom he was distributing a minor patronage, was crowding him, nor had I received a complaint from any of his larger creditors. I reckoned that he had about $10,000 due December first, chiefly for steel and stone.

I had sent inquiries to both these concerns regarding their accounts and the stone company's representative met me at the station, when I arrived in R . . . . City at noon on December second. He said Perry was furious at me for "injuring his credit," but that the stone company appreciated my concern for their interests, inasmuch as they had received to date not a penny of the $12,500 that had thus far been allowed for cut stone. Inasmuch as they were also entitled to an additional five thousand of the December payment, I offered to support a demand for the entire $10,000 I was just about to allow. But Smith (the stone man) said that Malloy had a prior demand from the steel company for $3,000, hence his stone company would be content for the present if they were paid the remaining $7,000 of my certificate. He added that they got all of Perry's business and considered him perfectly sound financially.

Arrived at the board meeting, I found Perry fuming, threatening and cajoling, by turns; evidently impressing all the board members except Malloy, who appeared quite imperturbable. Perry asked for a minute's private conversation with me in a committee room, whither we adjourned. One of the board members suggested that I'd better have a bodyguard.

"What's this you're trying to do to me, Will?" Perry opened.

"For instance?" I countered.

"Why damn it, damaging my credit by writing these letters to my subcontractors. Now, look-a-here, Will, you're a young man, just starting in your profession, and I'm in position to do you a lotta good, if we can work together. This ain't the only court house to be built in this part of the country, but, by God, if you're going to treat me like this, I'm right here to tell you that you'll never get another. Why, this is the damndest outrage—"

"Supposing you cut out the cussing and tell me how you propose to pay these bills," I suggested. "That happens to be about all I'm interested in right now."

"Well, then, young fellow, all I have to say is that it's none of your damned business how I run my affairs. I've told you that before and you might's well let it sink in. This is a public building, not subject to lien, and I'll not submit to your interference, by God, if I have to take the matter into court. But, now, look-a-here, Will, you don't understand my situation," and the consummate actor changed his tune to supplication. "I'm only a hired man of this building corporation (ninety-eight per cent. of the stock was in the name of his grown-up daughter), an', if I don't make a showing, I'm likely to lose my job." Real tears came to his eyes, as his emotion (?) overcame him. I was uncomfortable, but not fooled. "My God, Will, you don't understand what you're doing to me—"

"No," I admitted, "and I don't much care. So,

cut out the play-acting and say the rest to the board." I opened the door.

"Well, damn you! I'll get you for this," I heard him say as we returned to the session.

"Come to any agreement?" Malloy wanted to know.

"Yes," I said. "Mr. Perry is going to pay some of his bills."

He glared at me and then took Smith into the room we had just left. When they returned, he exhibited a receipt from the stone comapny for $10,000; then said he'd go over to the bank and telegraph $3,000 to the steel contractors, which he did.

While Perry was gone, Smith told me, confidentially, that he had been persuaded to accept two notes, signed by the Dependable Building Corp., without recourse to Perry, for $10,000 each; same to be credited on account, in lieu of a cash payment. Smith appeared to be quite satisfied. I later learned that the local banker was equally gullible. He accepted a similar note for $13,000 and then placed that amount to the corporation's credit, $3,000 of which was wired to the steel company. Its receipt was promptly wired back, and I had no alternative but to issue my certificate. I had called on some of the local dealers, none of whom appeared at all anxious about their account with Perry, apparently replying implicitly upon his promises. He again threatened me for "injuring his credit," but I had sized him up as a bully and was less interested in his conversation than in his actions. I didn't know about his having borrowed ten thousand dollars more than he needed at the bank, but I wondered what he intended to do with the equal amount he received from the county. I eventually found that, as agreed, he had left two thousand in the bank and had checked out the remaining $18,000 for transfer to his home-town bank, whence he re-checked it to himself for "back-salary."

December that year was but a week old when winter came in to stay, and all construction work in that section was forced to close down. This must have proved most disconcerting to the enterprising Perry, for only by continuing his operations could he hope to draw more funds and keep going. He closed two new contracts, but they couldn't help any. On January second, I sent up a certificate to the board, to pay the contractor $3,000, to be divided equally between the steel and excavating contractors, provided there were no other claims filed. There was none, but a telephone call from Malloy advised me that friend Perry was again on hand, "frothing at the mouth," and demanding another ten thousand which he said it was my understanding he was to receive to take up one of the stone company's notes. Of course, there had been no such understanding, but Malloy insisted upon my coming up to explain to the board.

Again, Perry wanted a private talk with me, but I said it was too evident that we needed witnesses to our conversation, hence I would talk in the presence of the board. He thereupon addressed himself to them, using the character of pleading in which he was so adept.

Said he, "I admit that Will here is a capable enough young fellow, but he hasn't had the experience in the building business that I've had, an' he's trying to make a record on this first big job of his at my expense. The figures on that statement (in Malloy's hands) show that I've spent twice as much to date as he's given me credit for and I ought to have the ten thousand he promised me to take up the stone company's note in addition to the measly little three thousand he's allowed me to pay on my other bills. I can stand off the steel company. They know my credit's good, but I ought to pay some of my local bills."

He continued to plead with tears running down his cheeks, telling how badly he needed living expenses for his wife and family, etc., etc. Two of the board members were sniffling, but there was nothing to be learned from Malloy's poker face. Presently, Carlson, one of the members, while Perry paused to wipe away his tears, addressed the chair: "Val, I tank sure Mr. Perry knows better vat his stuff cost as Mr. Meadows, cause he pays the bills. I move that we instruct Mr. Meadows to change his stif'cate to tirteen tousand dollars."

"Is that all right with you, Mr. Meadows?" asked the chair.

"I have no objection to the motion," I said, "but it wouldn't change my certificate. It happens that the contract states that the amount of the certificate is supposed to represent my idea of what is due, not that of the board or Mr. Perry. And, as to a comparison of my estimate and his, you might ask him how he expects to finish the building at his contract price, if these early items are costing him twice what they should. No, gentlemen, so far as my estimate is concerned, the amount stands. Inasmuch as neither the steel contractor nor the grader seems to be looking out for their interests, however, I'll waive the point of their receipts, if you prefer. But I want it distinctly understood that Mr. Perry's statement that he had an understanding that I was to allow him ten thousand this month to take up one of the notes he gave the steel company is pure fabrication on his part. Mr. Smith showed me those notes. One is for three months and the other for six."

"Now, see here, Will—" expostulated Perry.

"Just a moment, Mr. Perry," from Malloy, "Mr. Meadows has the floor."

"Thanks, Mr. Malloy. I was merely going to add, that, if Mr. Perry is so willing to invent a story about the note, doesn't it occur to you that his so-called estimate of costs might be equally undependable? And you want to bear in mind that he would have a direct interest in falsifying his statement, while I would not."

One would have thought that Perry would have resented being called a liar in such plain terms, but he was only intent on getting that extra money. He evidently had Carlson primed, for the persistent Swede was ready with another motion: "Den I move that we allow Mr. Perry tirteen tousand dollars witout any stif'cate from the artchitec'."

"What effect would such a payment have on our bond, Mr. Meadows?" the chair wanted to know.

"As I understand it," I said, "any payment made

otherwise than on your architect's certificate would render your bond worthless."

"Then, as I see it, Mr. Carlson," said the sage old chairman, "the only motion the chair can entertain is to pay the Dependable Building Corporation the amount of the architect's certificate."

"With a proviso," I stipulated, "that the board waives presentation of the receipts demanded there in my letter."

With that, Perry started to curse me, but Malloy shut him up and the motion was carried. I had to hurry away to catch my train; a most unhappy young architect. My efforts to look after my client's interest were assuredly misconstrued or, at least, unappreciated. My first court house job was going absolutely wrong.

Imagine my pleasure, then, about ten days later, upon reading a letter from good old Denny Malloy, telling me that the Dependable Building Corp. was in the hands of its creditors and he felt that the county owed me a vote of thanks for saving it the $10,000. He wanted me to get in touch with a representative of the surety company and arrange a meeting at R . . . . . City as soon as possible.

There were present at this meeting, besides the members of the board and myself, Perry and his local banker, Robertson, the foreman of the job, Bill Fielder, and a Mr. Patterson, Chicago attorney for the bonding company. My train did not arrive till noon, hence the others had been in session some hours before they reassembled after lunch. I learned that Perry and Patterson had come in together on the Chicago Pullman, which meant that the clever rascal had had ample opportunity to "sell himself" to the lawyer. His success at this was but further evidence of the man's wonderful acting.

The two entered the board room together and Patterson handed the chairman a paper, and a copy to me. It was a three-cornered agreement which he had drawn up, appointing Perry purchasing agent and general manager to complete the job, with Fielder as foreman. Perry was to get $100 per month for such time as his duties would demand, and Fielder was to receive $175 per month for full time. I caught Malloy studying my expression and detecting my disapproval. Perry was avoiding me, sitting on the other side of the lawyer who had taken a seat at the long table next to mine.

"We agreed this morning, Mr. Meadows," explained the chairman, "that, inasmuch as Mr. Perry has let most of the contracts for the building, and is practically ready to let the rest, it would be the most economical procedure to have him finish this part of the work. Doesn't that sound reasonable to you?"

I admitted the plausibility and continued to read the contract. The last clause stated that no purchases made by the said Perry nor contracts entered into by him were to be considered as valid and binding unless countersigned by representatives of the county and the surety company. Without saying anything, I dipped a pen in the ink and added "and the architect" at the end. Then reached for the other two copies and did the same. Perry started to flare up, but Patterson and Malloy could see no harm in the addendum, and it stood. 'Twas well it did.

During the following month, the creditors' committee delved into Perry's unfinished business, which comprised ten partially completed contracts in addition to the two on which no work had been done, which latter were promptly cancelled. It developed that the corporation had about $400,000 in liabilities and less than $10,000 in assets, consisting chiefly of secondhand equipment. There could be no profits anticipated from any unfinished contracts. I took the report of the committee and did a little figuring of my own. I computed that, during the three years that Perry had played his little racket, he had carried out all or part of fourteen jobs, two undertaken the first year, five the second and seven the third. The aggregate cost of this work was pretty close to $3,500,000, of which Perry had drawn nearly $3,000,000. He had paid himself a salary of $10,000 for the first year, $15,000 for the second and $20,000 for the third, and had applied our $3,000 on salary for the current year. This latter was all the creditors managed to recover from him. As he told me, he had supported his wife for a number of years, now she could take care of him for a while.

But the $45,000, which represented the salary that Perry had so generously turned over to his wife, was but a very small part of his winnings. His graft was in the lettings of subcontracts and in purchasing materials. To all vendors, he alleged that he was merely the purchasing agent of his company and that he had his price. This was anywhere from five to fifteen per cent. of the amount of the purchase. Assuming that he "subbed" three-fourths of the cost of each building at an average of ten per cent., which I felt was a low estimate (from confessions of several dealers), Perry had collected over $200,000 in such "commissions" in three years. No wonder Mrs. Perry could afford to support him for a while! And none of this money could be reached by his creditors, nor could they have actual knowledge of its existence. There was no law to touch him!

Yet this man had been appointed purchasing agent to complete my court house at a salary of $100 a month! It sounded altogether too fishy, and it was. But he let only three contracts before he discovered that they did not bear my signature. The foundation was still incomplete and but a small amount of structural steel erected when the work was shut down. The next thing to be awarded was the fireproofing, which Perry let to the Blank Fireproofing Co. for a flat $25,000; then the roofing to the Better Insulating Co. for $9,000, and the sheet metal work to the Guaranty Metal Co. for $4,000. (He seemed to have a penchant for round numbers.) Now, I had a price of $18,500 on the fireproofing, $7,250 on the roofing, and $3,100 on the sheet metal. I took this information to Malloy and, for the first time, with definite information to hand, explained Perry's whole system. He was astounded and begged me to go into

Chicago, with full authority to handle the situation with Lawyer Patterson. This I did, and he arranged the details of Perry's discharge, and the addition of the duties of purchasing agent to those of Foreman Fielder, at an increase of salary; it being understood that Fielder and I would work together in the matter.

Still, Perry wasn't through. Evidently, he had already collected all or part of his commissions from these three concerns, and it was up to him to deliver the contracts. The roofing and sheet metal people had gone ahead on his say-so and were making the special tiling and cutting and bending the copper. Fielder understood that he was to get at least three bids on each item, but before he could secure two others on the fireproofing, he received word from the Cinder Concrete Co., whose figure I was depending upon, withdrawing the bid. Evidently, they had been advised by Perry's concern to keep hands off, for both had headquarters in Chicago. The Cinder people had bid to me through a local agent, so I called him up and asked if he was prepared to execute a contract for the work. He said he was not authorized to sign a contract, but I urged him to bring over his correspondence and run through it with me. We found a letter from his company begging him to close the contract without delay, though it hardly meant for him to sign it. However, there was a nice commission in it for him, so, when I offered to sign for the county, he was willing to do his share, and we drew up several copies of a contract, to which we attached sworn copies of his "authority" and sent them out to interested parties. Then we waited results. On the second morning following, came the president of the Cinder Concrete Co. from Chicago, hot after the local agent for signing such a contract. It was the first intimation to the agent that the bid had been withdrawn and he insisted that he was entitled to his commission whether the contract was carried out or not. Now, this commission was twice as much as the "divvy" that President Miner's company was to get from the Blank Fireproofing Co. for backing out, hence he was ready to weaken. He told his agent that he wanted to talk to me and the purchasing agent and, if he found that we had knowledge of the cancellation prior to the execution of the contract, it would assuredly not be carried out. After talking with him, I offered to accompany him to R . . . . . City to interview Fielder.

We arrived at 12:30 and boarded the old horse-drawn bus that would cover the mile to town and to the hotel, for lunch. The bus was full and I rode on the rear step, after whispering to the driver to whip up when he passed the new court house. As he did so, I told Miner I'd meet him and Fielder at the hotel, and dropped off. In Fielder's little job-office, I went through his letter-file, found the telltale letter of cancellation and transferred it to my pockets; then strolled on over to the hotel and sat down to lunch with Miner and Fielder. I had no opportunity to tell Fielder what I had done, before he had agreed with Miner that, if the letter antedated the contract, the latter might be declared void. However, Fielder's memory was very vague as to his ever having seen such a letter. But Miner had no reason to question Fielder's later assertion that he was absolutely certain that *all* correspondence with the Cinder Concrete Co. *must* be in that file—and there was no letter of cancellation to be found.

The Cinder Concrete Co. carried out their contract, saving the county $6,500—and we made the other savings also. Of course, we had all of Perry's creditors to contend with, but we simply turned them over to the court and started afresh. None of them ever got a penny, not even the unfortunate stone company, with its two worthless notes; though we bought the remainder of the stone from Smith at a fair price. We overran the contract amount by nearly $30,000; hence looked to the surety company to make good this deficit. While we were dickering with them, fire destroyed my office and every record of the case; but I found a copy of every paper carefully filed in the office of the county auditor, hence was able to make a complete restoration.

And the surety company settled with honest old Denny Malloy and his board without a lawsuit. I presented a claim for $1,800 for additional services, with Malloy's approval—but Perry's influence was still dogging my footsteps. His banker, Robertson, had replaced one of the Scandinavians on the board, in order to assist in winding up court house business (and try to salvage some of his $13,000 loan, which I had to prevent), and the other members had to compromise with him; hence my extras were cut to $1,200, with which I was forced to rest content. It was all the harm Robertson could do me, but he appeared to relish even that.

In my thirty years of subsequent practice, I have continued to find much of romance mixed with the business of building, but that court house job has ever held the preeminence in this respect. And I have encountered other pyramiders, but none to compare with the versatile Jim Perry.

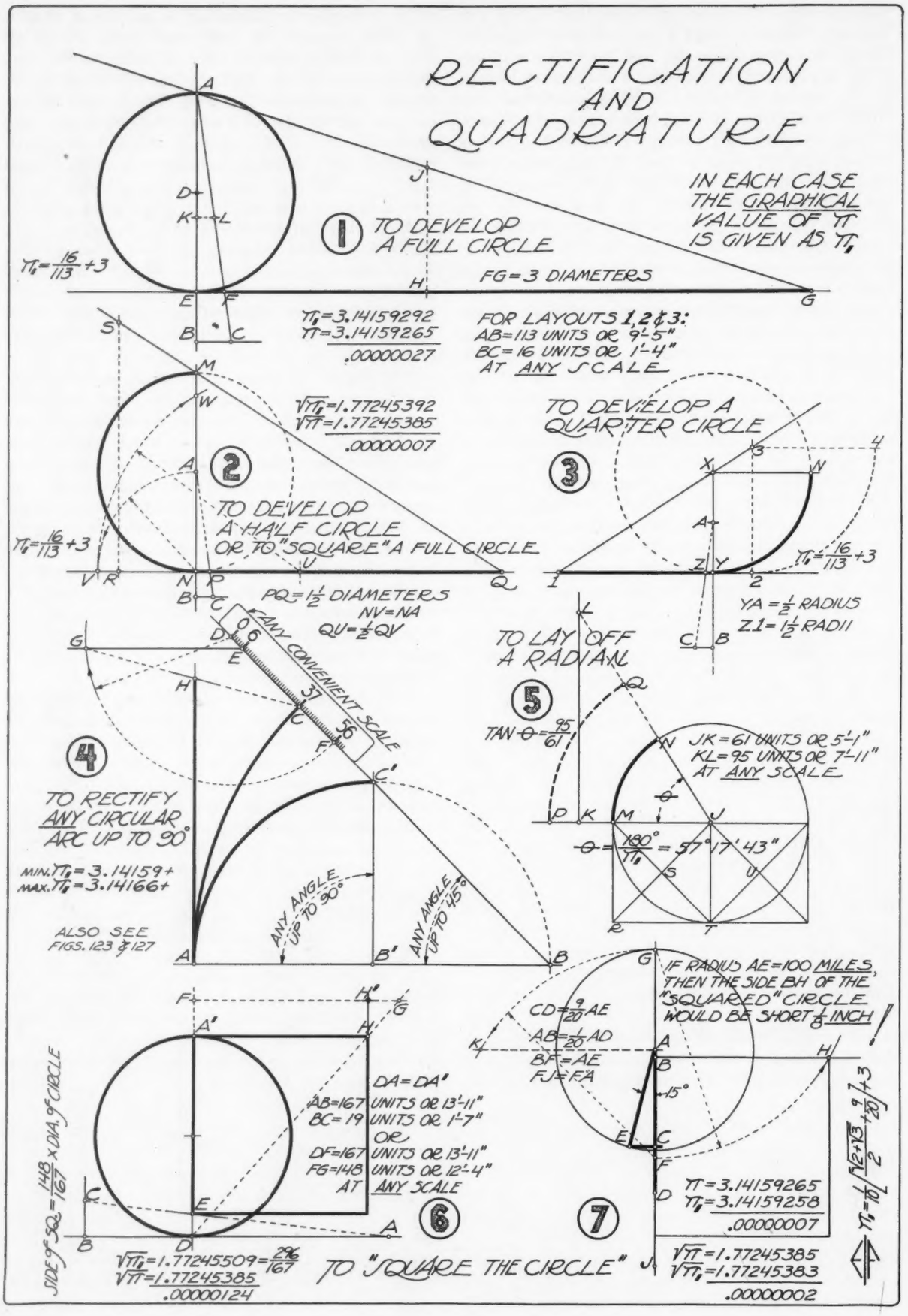

RECTIFICATION AND QUADRATURE
IN EACH CASE THE GRAPHICAL VALUE OF π IS GIVEN AS π₁
1 TO DEVELOP A FULL CIRCLE
FG = 3 DIAMETERS
π₁ = 16/113 + 3
π₁ = 3.14159292
π = 3.14159265
.00000027
FOR LAYOUTS 1, 2 & 3:
AB = 113 UNITS OR 9'-5"
BC = 16 UNITS OR 1'-4"
AT ANY SCALE
2 TO DEVELOP A HALF CIRCLE OR TO "SQUARE" A FULL CIRCLE
√π₁ = 1.77245392
√π = 1.77245385
.00000007
PQ = 1½ DIAMETERS
NV = NA
QU = ½QV
3 TO DEVELOP A QUARTER CIRCLE
YA = ½ RADIUS
Z1 = 1½ RADII
4 TO RECTIFY ANY CIRCULAR ARC UP TO 90°
ANY CONVENIENT SCALE
MIN. π₁ = 3.14159+
MAX. π₁ = 3.14166+
ALSO SEE FIGS. 123 & 127
ANY ANGLE UP TO 90°
ANY ANGLE UP TO 45°
5 TO LAY OFF A RADIAN
TAN θ = 95/61
JK = 61 UNITS OR 5'-1"
KL = 95 UNITS OR 7'-11"
AT ANY SCALE
θ = 180°/π₁ = 57° 17' 43"
6 TO "SQUARE THE CIRCLE"
SIDE of SQ. = 148/167 × DIA. of CIRCLE
DA = DA'
AB = 167 UNITS OR 13'-11"
BC = 19 UNITS OR 1'-7"
OR
DF = 167 UNITS OR 13'-11"
FG = 148 UNITS OR 12'-4"
AT ANY SCALE
√π₁ = 1.77245509 = 296/167
√π = 1.77245385
.00000124
7 TO "SQUARE THE CIRCLE"
IF RADIUS AE = 100 MILES, THEN THE SIDE BH OF THE "SQUARED" CIRCLE WOULD BE SHORT ⅛ INCH !
CD = 9/20 AE
AB = 1/20 AD
BF = AE
FJ = FA
π = 3.14159265
π₁ = 3.14159258
.00000007
√π = 1.77245385
√π₁ = 1.77245383
.00000002

FIGURE 122

The Geometry of Architectural Drafting

14—The Subjugation of the Circle

By Ernest Irving Freese

Editor's Note:—*This article, continuing the series begun in August, 1929, is copyright, 1931, by the author.*

Now comes an utterly *new* kind of geometry: a geometry that transforms circles to straight lines, and straight lines to circles; that divides a circular arc in rectilinear ratio, or a straight line in angular ratio; that converts circular measure to linear, or linear to circular—a geometry that puts a stop to the interminable decimal in "pi" at such a point that the infinite overplus fades to a graphical zero. Call it *arc*-ology—if you like—but it's far from antique.

For the first time in the history of practical drafting, precise graphical *cyclometry* herewith becomes a fact. The total graphical subjugation of the circle has been accomplished. You can now abandon all those time-wasting tedious cut-and-try methods of "stepping it off" with all their concomitant accumulations of error. You can now do *anything you like* with any portion of a circle by means of the simple graphics herein for the first time made known. Moreover, you can do it with such a degree of precision that the same values laid off from mathematical calculation become *inexact* in comparison. As a matter of fact if it were not for the constructed values of "pi" which I have given on each layout or, in lieu of this graphical pi-value, stated the limits within which the construction remains precise, even a seasoned mathematician would have a terribly involved trigonometrical transaction trying to "figger out" where graphical precision ended and the lopped-off infinite overplus of the transcendental "pi" became multiplied into measurability. Also, said mathematician would have to throw away his cherished slide-rule: for the results of the "graphical" calculations here given are more exact than any "slip stick" could possibly yield—Oh well, let's have 'em:—

FIGURE 122, Diagram "1":

Make AE any circle's diameter, and draw EG perpendicular thereto. Make AB equal 113 units, or 9′-5″, at *any* scale, and make BC, perpendicular to AB, equal 16 units, or 1′-4″, at the *same* scale. Cross EG at F with AC. Add three diameters to EF, and the summation EG is the circumference. Is it? Well, suppose the radius DE were a mile—not a scale mile: an *actual* mile—63,360 inches. Then EG would be less than 1/29th of *one* inch too long. Now reduce that mile radius by a factor that will bring the construction within the limits of the hugest drafting board ever built, and that 1/29th of an inch overplus will shrivel in the same ratio. Then EG *is* the circumference. Now, since ABC determines the invariable slope of the pi-minus-three line AC, you can ever after use this same triangle to find the "stretch-out" of any circle whatsoever. Say AK is *any given diameter* laid off on AB. Then, always, the "rise," KL, plus thrice the "run," AK, is the circumference. Nothing easier or simpler could be imagined. But suppose conditions demand that you find a diameter that will yield a given length of circumference. In that case, lay off a line GA at a slope of 113:355, which is 9′-5″ rise to 29′-7″ run. Lay off GH equal to the given length of circumference, and the perpendicular HJ is the required diameter. Now *compute* HJ by dividing GH by a six-place pi-value, and never in a thousand years will you be able to lay *that* off. But there it is—graphically—HJ. In other words, precise draftsmanship is here of more avail than six-place-decimal calculation.

FIGURE 122, Diagram "2":

Make AN any given radius, and draw NQ perpendicular thereto. Establish the slope of AC as before, and make PQ thrice AN. Then NQ is the development of the semicircle NM to within less than 1/58th of an *inch* for a radius of a *mile*. It is now apparent that the slope of the line QM is bound to remain "as is" for all semicircles. And it can easily be deduced that this invariable slope corresponds to a rise of 18′-10″ in a run of 29′-7″. Wherefore, if such a line be drawn, and *any* desired semicircumference QR be laid off on the horizontal, then the vertical ordinate RS materializes the required diameter. Incidentally, the area of the triangle thus formed is the area of the *complete* circle whose half circumference and full diameter are the rectangular sides of said triangle. Now, calling the radius AN of the circle by the name of unity, or 1, it is plain to be seen that NQ is a rectilinear picture of "pi" correct to the sixth decimal place. Hence, by graphical extraction of the square root of NQ, a line can be found that will be one side of a square of equivalent area to the circle and also equal in area to the triangle MNQ. It's easy to do. Just make NV equal NA; then bisect VQ at U; then from U as a center, revolve V to W. Whence, WN squares the circle whose radius is AN and whose semicircumference is NQ; and it also squares the triangle

whose right-angular sides, or whose base and altitude, are *MN* and *NQ* respectively. Again assigning a length of one *mile* to the radius *AN*, and finding *NQ* by the construction shown, it can then be proved that the extracted side *WN* of the "squared" circle would not exceed its true length by more than 1/225th of one *inch*. I don't know of much practical use for this *squared* circle, but I do know that there exists a whole tribe of "circle squarer's" whose constant endeavor is to materialize it. Eventually, this leads to the madhouse. Wherefore, *as a humanitarian measure*, I shall herein later record a method of quadrature which should stop all further futile efforts for a couple of thousand years—or else aggravate the circle-squarers into a higher state of madness!

FIGURE 122, Diagram "3":

Make *XY* the radius of any quadrant, and bisect this radius at *A*. Draw *Y1* perpendicular to *XY*, and locate *Z*, on *Y1*, by establishing the slope of *AC* in the manner heretofore explained. Make *Z1* equal thrice *YA*. Then *Y1* is the development of the quadrant *YN*, so exact that 1/116th of an *inch* would exceed the difference for a radius of one actual *mile*. Is that close enough? To reverse the process, draw a sloping line *1X* such that it has a rise of 18′-10″ in a run of 29′-7″; then lay off *1-2* equal to any given length of quadrant; then *3-2* is the radius required to bend the straight line *2-1* into a quarter circle *2-4*.

FIGURE 122, Diagram "4":

This is the most exact general construction ever evolved for finding the length of any circular arc whatsoever up to a full quadrant. Let *AC′* be the given arc, with center at *B′*, and subtending any angle, *AB′C′*, not over 90 degrees. Make *B′B* equal the radius, and make *BC*, through *C′*, equal twice the radius. Now the arc *AC*, swung from center *B*, is exactly the same length as the given arc *AC′* swung from center *B′*. Hence, the development of the arc *AC* will be the development of the arc *AC′*. It is found as follows: lay any suitable scale along *BC*, making the 37-mark register with *C*; then mark off the proportionate distances clearly designated by the diagrammed scale. Draw *EG* parallel with the opposite leg *B′A* of the angle, and cut *EG* at *G* with radius *DF*, as shown. Now project the tangent from *A* to cross *GC* at *H*. The straight line *AH* is then the graphical rectification of the given arc *AC′*, as it also is of the interposed arc *AC*. Hence, since the angle *ABC* is always half the angle *AB′C′*, it is evident that, for arcs not exceeding 45 degrees, the point *C* is already located on the arc itself. For instance, let *AC* be the given arc, with center at *B*, and subtending any angle, *ABC*, not over 45 degrees. Then *AH*, as before, is the graphically-developed length of *AC*. Allowing a maximum deviation of 1/200th of an inch—which is about the width of the finest pencil line you can draw—from the exact length of the circular arc, the minimum full size radius that would produce such a deviation in *AH* would be 13′-3″, and it would occur at about 75 degrees; while for a 45-degree arc it would take a full size radius of 131′-4″ to produce the same discrepancy; and at 90 degrees a radius one half the latter. So, you see, this simple rectification can be applied even to full size arcs on any drafting board ever built without in the least manner producing any measurable difference between the length of the arc and its graphical rectification. Is that close enough?

FIGURE 122, Diagram "5":

Once upon a time the author discovered the fact that the fraction 95/61 represents the trigonometrical tangent of 180 degrees divided by "pi," to within 1/2000th of an angular degree. Hence, this affords a ready and an exceedingly precise method of graphically converting angular to circular measure; for an angle of 180 degrees divided by "pi" is the angle subtended by an arc equal in length to its own radius. Such an arc is termed a *radian*. It is the unit of circular measure—a curvilinear unit of length—in distinction to angular measurement in degrees. There are "pi" radians in a half circumference. To lay off a radian, graphically, is the simplest thing imaginable: make *JK* equal 5′-1″, and make *KL*, perpendicular thereto, equal 7′-11″, at any scale whatsoever; then the arc *MN*, drawn from center *J*—or any other arc *PQ* drawn from the same center—is equal in length to its own radius, to such a high degree of exactitude that the theoretical difference would not become measurable until the radius of the arc amounted to 47′-0″ actual length. Is that close enough? Well, here's one that's *exact*, and if you are gifted with analytic acumen, you'll know why: the triangle *JMR* is equal in area to the radian-sector *JMN*; the square, *JSTU*, is also equal in area to the same radian-sector; the square *JMRT*, or any other square whose side equals the radius of a circle, is equal in area to the area of the circle divided by "pi"—*exactly so*.

FIGURE 122, Diagram "6":

Construct a right angle of which *DA* and *DA′* are each equal to any circle's diameter. Cross *DA′* at *E* with a line from *A* having a rise, *BC*, of 1′-7″ in a run, *AB*, of 13′-11″. Then *EA′* is the side of the "squared" circle to within less than 1/50th of an inch per mile diameter. And here's another one that'll not only square the circle but that will also circle the square: draw any line *DG* having a slope of 148:167 relative to another line *DF*, that is, make *DF* equal 13′-11″ at any scale you choose, and make *FG*, perpendicular thereto, equal 12′-4″ at the *same* scale; then if *DA′* is the diameter of a circle, *A′H* is the side of an equal square; or if *FH′* is the side of a square, and this be projected to the position *A′H*, then *A′D* is the diameter of an equal circle—each to the same degree of theoretical exactitude as before. Is that close enough? Most certainly it *is*—for any work performable on any drafting board that could be gotten through the doorway of a drafting room peopled by giants! But now I shall keep my promise heretofore made. I'm going to show you the most exact Euclidean construction for "squaring the circle" that has ever been put on record. It's due to the author's discovery of the fact that if the fraction, 9/20ths, be added to the cosine of 15 degrees, and this sum be divided by 10, and the result subtracted from the "in-

commensurable decimal" in "pi," *the difference will be zero up to the eighth decimal place.* This is the one I mentioned a while ago—the one that will put the quietus on the "circle squarers" for a score of centuries hence—or plunge them further into madness! This is it:—

FIGURE 122, Diagram "7":

Freese's quadrature of the circle. Draw *AE*, the radius of the circle, at an angle of 15 degrees to any prolonged diametral line *GJ*. Project *E* to *C*, perpendicular to *GJ*, and make *CD* equal 9/20ths of *AE*. Then cut off 1/20th of *AD*, locating *B*, and make *BF* and *AG* each equal *AE*. From *G* as a center, revolve *F* to cross a perpendicular from *B* at the point *H*. Then *BH* is one side of the "squared" circle to within about 1/50000000th part of the radius. This is not a misprint: the deviation is about one *fifty-millionth* part of *AE*, that is, if *AE* were *100 miles*, then *BH* would be short by about an *eighth of an inch*. Is *that* close enough? The same result comes from revolving *G* to *K* from center *F*: *AK* equals *BH*. Now make *FJ* equal *FA*. Then *GJ* is half the circumference of the circle to within about 7/100000000ths of the radius. Now let the radius *AE* equal unity. Then *GJ* and *BH*, respectively, are each the most accurate rectilinear values of "pi" and its square root *that have ever been constructed.* Moreover, the results can be proved, without recourse to trigonometry, by the purely arithmetical formula which I have seen fit to record along with this construction. Now I can proceed with things more worth while!

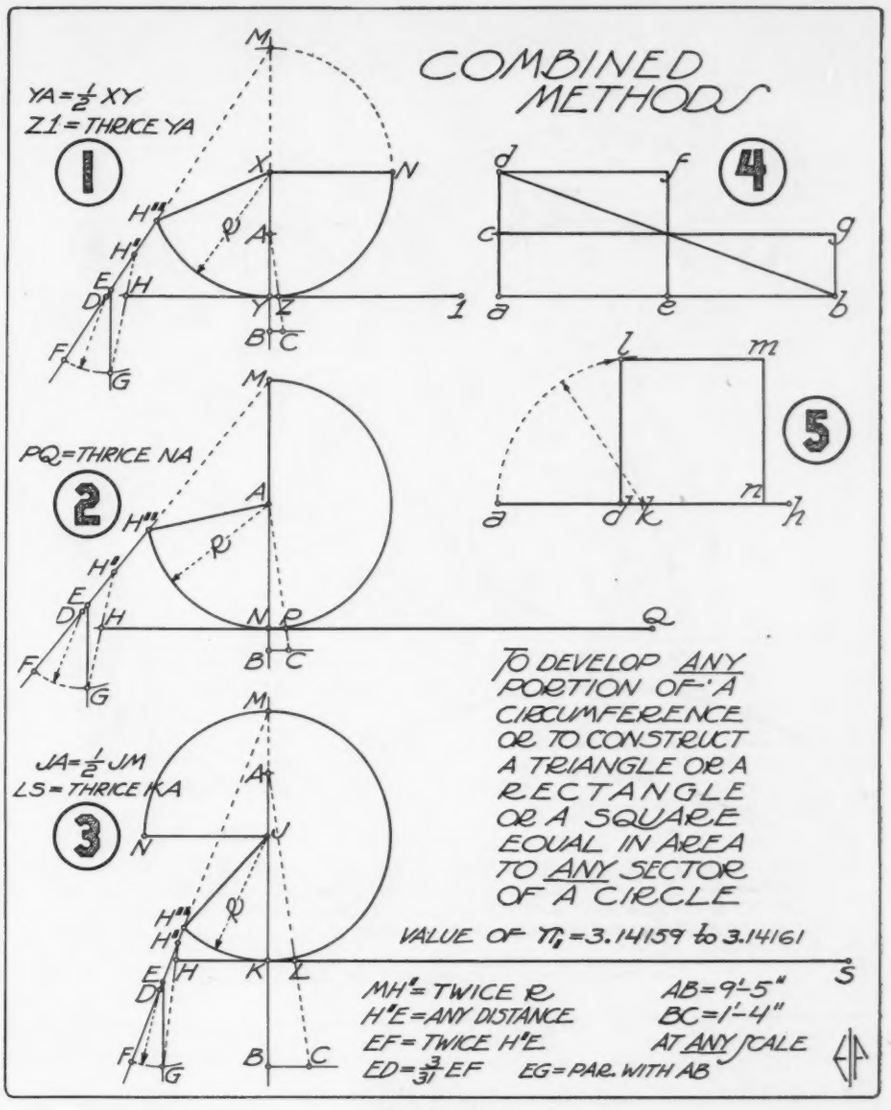

COMBINED METHODS
YA = ½ XY
Z1 = THRICE YA
1
PQ = THRICE NA
2
JA = ½ JM
LS = THRICE KA
3
4
5
TO DEVELOP ANY PORTION OF A CIRCUMFERENCE OR TO CONSTRUCT A TRIANGLE OR A RECTANGLE OR A SQUARE EQUAL IN AREA TO ANY SECTOR OF A CIRCLE
VALUE OF π = 3.14159 to 3.14161
MH' = TWICE R
H'E = ANY DISTANCE
EF = TWICE H'E
ED = 3/31 EF
EG = PAR. WITH AB
AB = 9'-5"
BC = 1'-4"
AT ANY SCALE

FIGURE 123

FIGURE 123, Diagrams "1," "2," and "3":

In Diagram "1," the quadrant arc *YN* is unbent to the straight line *Y1* by the method that has already been shown (Figure 122, Diagram "3"), and the arc *YH''*, being *less* than a quadrant, is developed into the continued portion *YH* in accordance with the method also before shown (Figure 122, Diagram "4"): the *total* straight line *1H* thus becoming the graphical development of the given arc *NYH''*. In a similar manner, as shown in Diagrams "2" and "3," the combination will yield the development of any portion whatsoever of a circumference. And with an utterly astounding degree of exactitude—as is evidenced by the exceedingly minute variation in the minimum and maximum graphical pi-values noted in the Figure. The location of point *A* varies in accordance with the number of full quadrants contained in the given arc, but the *slope* of *AC* is invariable, as has heretofore been shown. The point *H'* here corresponds to the point *C* of Figure 122, Diagram "4," but the method of laying off the points that locate *H* is slightly different from that before given, though the results are identical. To locate *H*, as per Diagrams "1," "2," and "3" of Figure 123, proceed as follows: make *MH'* equal twice the radius of the given arc; make *H'E* any distance, but preferably one directly divisible by 31; make *EF* equal twice *H'E*; and make *ED* equal 3/31 of *EF* or, which is the same thing, 6/31 of *H'E*; draw *EG* parallel with *AB*, and locate *G* thereon with radius *DF* as shown; then the line *GH'* fixes the limit of the rectilinear development at point *H* as shown. Actually, this construction is as

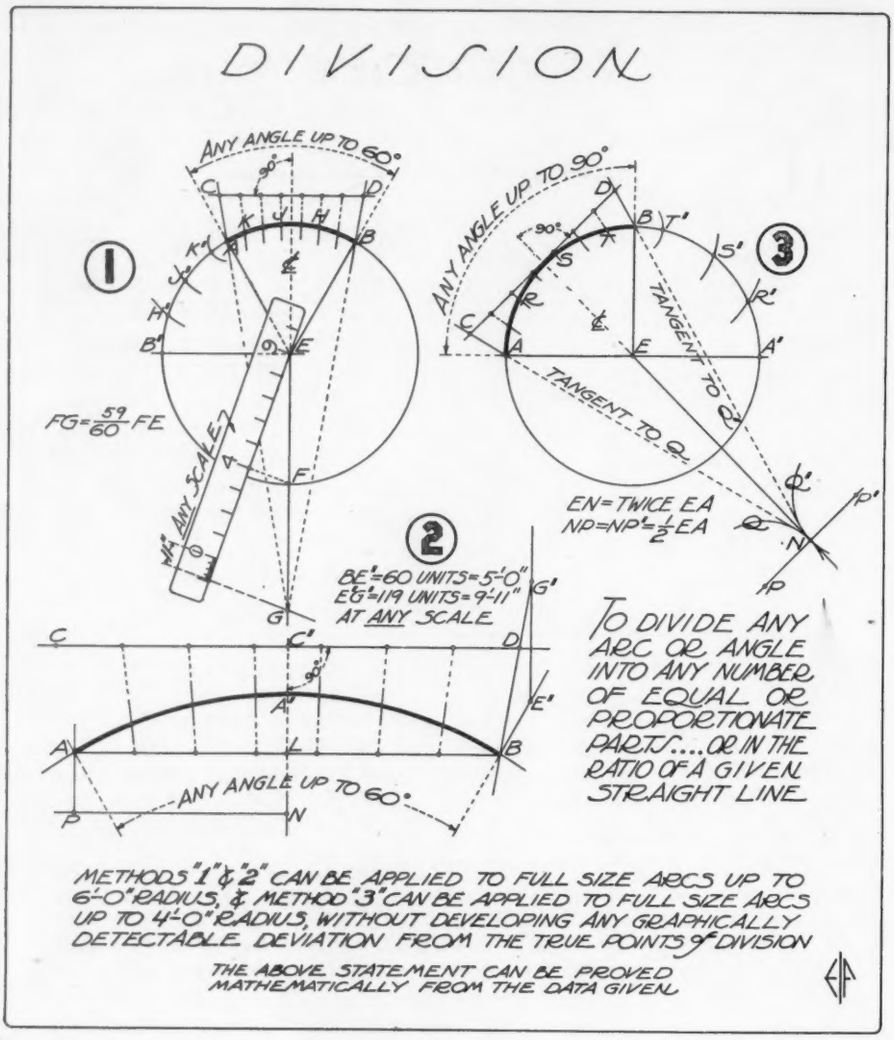

DIVISION
ANY ANGLE UP TO 60°
ANY ANGLE UP TO 90°
FG=59/60 FE
ANY SCALE
TANGENT TO Q
TANGENT TO Q'
EN=TWICE EA
NP=NP'=1/2 EA
BE=60 UNITS=5'-0"
EG=119 UNITS=9'-11"
AT ANY SCALE
TO DIVIDE ANY ARC OR ANGLE INTO ANY NUMBER OF EQUAL OR PROPORTIONATE PARTS....OR IN THE RATIO OF A GIVEN STRAIGHT LINE
METHODS "1" & "2" CAN BE APPLIED TO FULL SIZE ARCS UP TO 6'-0" RADIUS, & METHOD "3" CAN BE APPLIED TO FULL SIZE ARCS UP TO 4'-0" RADIUS, WITHOUT DEVELOPING ANY GRAPHICALLY DETECTABLE DEVIATION FROM THE TRUE POINTS OF DIVISION
THE ABOVE STATEMENT CAN BE PROVED MATHEMATICALLY FROM THE DATA GIVEN

FIGURE 124

fast as it is accurate—and the qualifying adjective is "*very*."

FIGURE 123, Diagrams "4" and "5":

Lay off, as at Diagram "4," *ab* equal to the length of any arc whatsoever up to and including a full circumference. Perpendicular to this, lay off *ad* equal to the radius of the arc. Bisect both lines at *e* and *c*, respectively. Then the rectangles *adfe* and *acgb* are each equal in area to the corresponding sector of the circle, and the triangle *abd* is of the same area. Or, as at Diagram "5," lay off *ad* equal to the radius, and *dh* equal to *half* the length of the arc. Bisect *ah* at *k*, and, from this point, wherever it may fall, revolve the point *a* to cross a perpendicular from *d* at point *l*. Then the square *dlmn* is equal in area to the corresponding sector of the circle of which *ad* is its radius and *dh* is half the length of its arc. So there you are—every conceivable arc has been unbent into a straight line—every conceivable sector of a circle has been "triangled," "rectangled," and "SQUARED." Now for graphical curvilinear *division*:—

FIGURE 124, Diagram "1":

Let *AB* be a circular arc subtending any angle, *AEB*, not over 60 degrees. Bisect it, and make *FG*, on the bisector, equal 59/60ths of the radius—which latter operation is quickly done in the graphical manner diagrammed. Project lines from *G* through the limiting points *A* and *B* of the given arc. Anywhere across these two converging lines, draw a straight line *CD* perpendicular to the bisector of the arc. Divide this straight line in any manner you choose—into equal, unequal, proportionate, or perspectively-diminishing, parts. (See Part 11.) Project the resultant division-points onto the arc by lines to *G* as shown. The arc *AB* then becomes divided in the same ratio as the straight line *CD*; no graphical deviation from any one true division-point becoming detectable on any arc up to a full size radius of 6′-0″. Moreover, *no accumulation of error is possible.* Now suppose *B′AB* to be an arc exceeding 60 degrees but not exceeding *twice* sixty. Suppose further that you desire to divide it into, say, 7 equal parts. Just divide half of it, that is, *BA*, into 3½ parts by the method just shown, resulting in the division-points *H*, *J*, and *K*. Then, about *A* as a center, revolve these to the other half of the arc at *H′*, *J′*, and *K′*. The most accurate and expeditious way, however, of transferring points from one half of an arc to the other half—especially so if the points are multitudinous, as in a detailed arch ring for instance—is as follows: Over the arc *BA*, lay a piece of tracing paper or linen, and indent therein the points *B*, *H*, *J*, and *K*. Then revolve the tracing about the center of the arc so as to bring *B* into registry with *K*, or *K* into registry with *B′*, and so as to cause the other indented points of the tracing to align with the arc beneath. Then transfer the points *directly* to the arc by indentation *through* the tracing-points.

FIGURE 124, Diagram "2":

Same as Diagram "1," but especially suitable either to arcs of large radius where point *G* of Diagram "1" would not come within the limits of the drafting board or in cases where the arc center itself is off the board. As before, *AB* is *any* given arc up to 60 degrees. Bisect it. Draw the chord *AB* and any other paralleling line *CD*. On a radial through either limiting

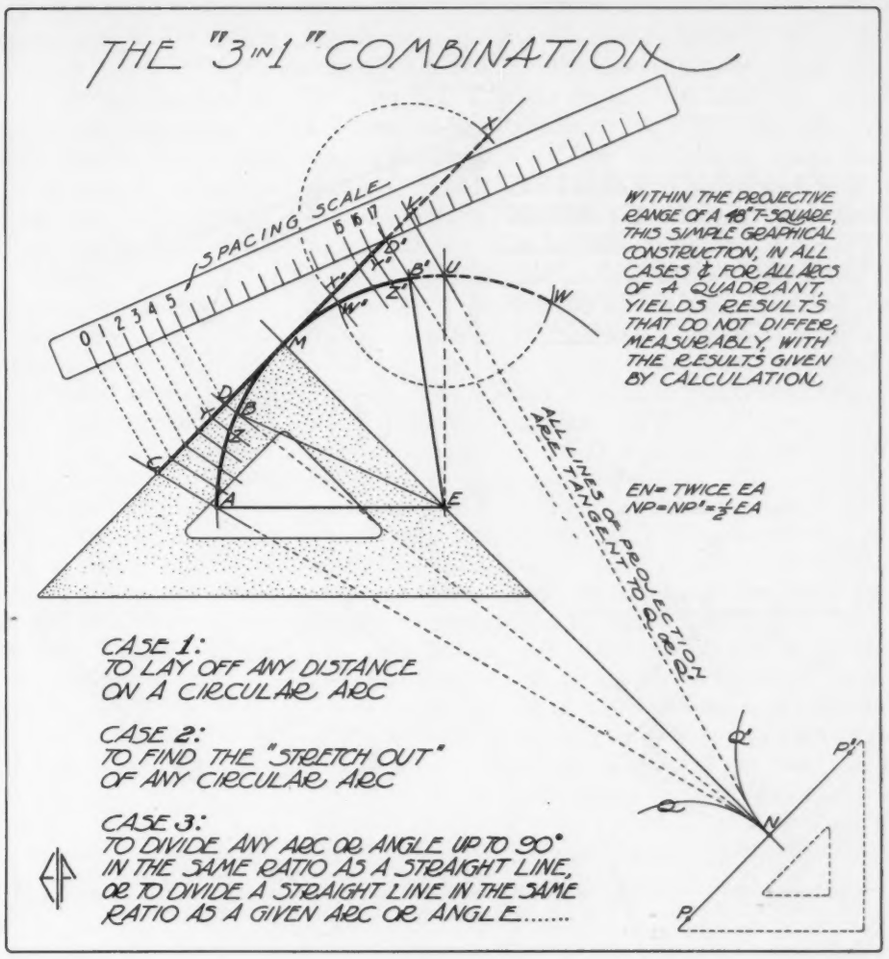

THE "3 IN 1" COMBINATION
SPACING SCALE
0 1 2 3 4 5
WITHIN THE PROJECTIVE RANGE OF A 48" T-SQUARE, THIS SIMPLE GRAPHICAL CONSTRUCTION, IN ALL CASES & FOR ALL ARCS OF A QUADRANT, YIELDS RESULTS THAT DO NOT DIFFER, MEASURABLY, WITH THE RESULTS GIVEN BY CALCULATION
ALL LINES OR PROJECTION ARE TANGENT TO Q OR Q'
EN= TWICE EA
NP=NP'=½EA
CASE 1:
TO LAY OFF ANY DISTANCE ON A CIRCULAR ARC
CASE 2:
TO FIND THE "STRETCH OUT" OF ANY CIRCULAR ARC
CASE 3:
TO DIVIDE ANY ARC OR ANGLE UP TO 90° IN THE SAME RATIO AS A STRAIGHT LINE, OR TO DIVIDE A STRAIGHT LINE IN THE SAME RATIO AS A GIVEN ARC OR ANGLE.....

FIGURE 125

point of the arc, say point *B*, lay off *BE'* equal to 5'-0" at any scale convenient, and lay off *E'G'*, perpendicular to *AB*, equal to 9'-11" at the *same* scale. Connect *B* and *G'*, thus locating *D*. Make *C'C* equal *C'D*. Now divide the two lines *AB* and *CD* each in the same manner as you desire the arc to be divided. A straightedge aligned with the corresponding division-points of the two straight lines will cross the arc at the points desired. Like the method of Diagram "1," the limit of graphically-precise division is reached at an angle of about 60 degrees on an arc of six feet radius. To find this limiting angle on an arc whose center is off the board, do this: make *NP*, on any line perpendicular to the bisector of the angle, equal half the known radius of the arc; then, parallel with the bisector of the angle, project the point *P* to the arc at *A*. Then *AA'* is an arc of *30 degrees*, and a repetition of the process on the other side of the center line will yield the other limiting 30-degree point *B*; or, same thing, revolve *A* to *B* from center *A'*. In other words, you merely find a chord equal in length to the radius; for the arc of such a chord subtends an angle of 60 degrees. It can be found directly, if one limiting point, say *A*, is established, by using this point as a center from which to swing an arc of a radius equal to the radius of the circle, cutting the arc at *B*—60 degrees from *A*.

FIGURE 124, Diagram "3":

Let *AB* be *any* arc not exceeding a full quarter circle. Bisect it, and make *EN*, on the prolonged bisector, equal twice the radius. Draw a prolonged tangent, *CD*, through the bisection-point of the arc, and draw *PNP'* parallel with this tangent, making *NP* and *NP'* each equal half the radius of the given arc. From *P* and *P'*, as centers, draw the short arcs *Q* and *Q'* as shown. Project *A* to *C*, via a tangent to *Q*, and project *B* to *D*, via a tangent to *Q'*. Now divide the thus-limited tangent line *CD* in *any manner you choose*, and project the resultant points to the arc *AB* via tangent rays to *Q* or *Q'*, whichever of the latter two curves happens to be on that particular side of the bisector of the angle. The circular arc *AB* then becomes graphically divided in the same ratio as the straight tangent *CD*; no measurable deviation from any one true point of division occurring on any arc up to a full 90 degrees or for any radius up to four feet. If the given angle exceeds a right angle, but does not exceed 180 degrees, then divide half the given arc into half the required total divisions, and transfer the thus-found points to the other half either with the compass revolving about the *bisection-point* of the full arc, or with a piece of tracing linen revolving about the *center* *E* of the arc—both methods having been noted in connection with Diagram "1." In some such expeditious fashion, the *full semicircle* of Diagram "3" has been divided into seven equal parts with a degree of precision unapproachable by any other known method. That old-old primitive "stepping it off" system of trial-and-tribulation is hereby "backed off the boards"—once you get the hang of these new methods illustrated by the various diagrams of Figure 124—and 125—and 126.

FIGURE 125:

This is a marvel. And it's all done with the T-square, a 45-degree triangle and a drafting-scale. It'll bend a straight line 'round a circle, unwind a circular arc into a straight line, and divide arcs and angles with almost uncanny facility and precision. The combination, however, requires some room. But this

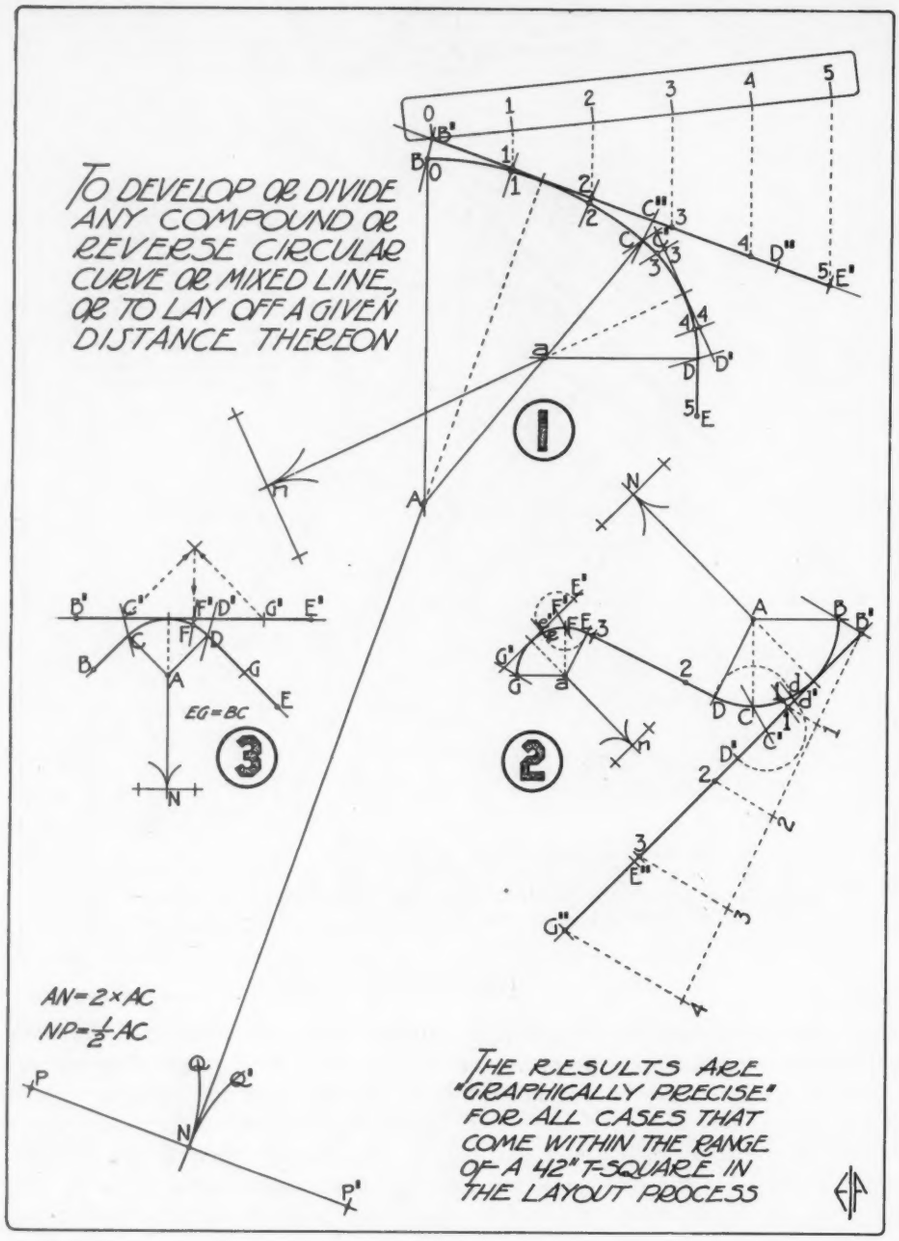

TO DEVELOP OR DIVIDE ANY COMPOUND OR REVERSE CIRCULAR CURVE OR MIXED LINE, OR TO LAY OFF A GIVEN DISTANCE THEREON
1
2
3
EG=BC
AN=2×AC
NP=½AC
THE RESULTS ARE "GRAPHICALLY PRECISE" FOR ALL CASES THAT COME WITHIN THE RANGE OF A 42" T-SQUARE IN THE LAYOUT PROCESS

FIGURE 126

is fortunate rather than otherwise, since this condition makes it self-limiting to arcs and circles not exceeding a full size radius of about 16 inches. Up to this maximum radius, all operations indicated are graphically precise, and all then come within the working range of a 48-inch T-square. Let *EA* be the radius and the normal horizontal spring line of any given circular arc. Locate *N* on a 45-degree line through *E*, distant two radii from *E*. Also draw the short arcs *Q* and *Q'*, with a radius equal to half of *EA*, and with centers on a 45-degree line through *N*. Then draw the prolonged 45-degree tangent through *M*, and project *A* to *C*; and *U* (the 90-degree point in respect to *A*) to *V*; by tangent rays emanating from the corresponding arcs *Q* and *Q'*. This projection does not require the drawing of any lines at all—in fact it should be done with one point of the dividers instead of with the pencil point. For instance: place the divider-point at *A*, swing the straightedge into touch, then swing it into tangency, "by eye" in this case, with *Q*, then indent *C* — the required point. The process is typical. Now you are all set to put this combination to *work*. First you may want to lay off a certain distance—any distance—*in feet and inches*, along the line of this arc from the spring point *A*. Make this distance *CD* on the tangent as shown. Project *D* to *B* via a tangent ray to *Q*. Then *AB* is the required distance, bent to the radius *EA*. Or, let the given distance be *CX'*. Project *X'* to *W'*, via a tangent ray to *Q'*. Then *AW'* is the required distance on the arc. Again, let the given distance be *CX*, which puts it beyond the 90-degree development-point, *V*, by the excess *VX*. Revolve this excess about *V* to *VX'*. Project *X'* to the arc in the manner now plain. Then the arc-measure of *VX* is *UW'*. Hence revolve *W'*, about *U* as a center, to point *W*. Then *AW* is the distance *CX* bent to the curve of the given arc. Now, it is plain to be seen, that any portion of the given arc can be "stretched out" to a straight line on the 45-degree tangent *CX* by an exact reversal of any one of the above operations—this second case requiring no further elucidation. So comes division—the third case of this astonishingly-workable "three-in-one" combination. Take the arc *AB*, for example. Find the stretch-out of it as in case 2, which is *CD*. Divide this portion of the 45-degree tangent in any manner you desire. Project the division-points to the arc, which latter then becomes divided in like manner —the linear divisions on *CD* accommodatingly bending into corresponding lengths on *AB*. In the same manner, the arc *AB'* is in the process of being divided into 17 equal parts corresponding to the 17 like parts of the developed tangent *CD'*. Likewise, any portion of any arc can be cut off in a given ratio. In the Diagram, *B'Z'* is 1/12th of the arc *B'B*; the arc *BZ*

is 1/5th of the arc *BA*; etc., etc. Also, the angle *AEB* is to the angle *AEB'* as the straight line *CD* is to the straight line *CD'*. Well, as I have said, this combination is a marvel—within the limits prescribed. Finally, for arcs of the maximum limiting radius, or thereabouts, that are to be divided into an exceedingly large number of small parts, it is a simple matter to cut a small arc, *Q* or *Q'*, from thin cardboard and thumb-tack this to the board alternately on one side of *N* and the other, in proper position, against which the blade of the T-square or other straightedge will automatically produce the tangent lines of projection required. This useful expedient is, of course, applicable to the substantially same method of division shown at Diagram "3" of Figure 124: the only difference in the two methods of division being that, in Figure 124, the rectification of the arc takes place on a tangent line drawn perpendicular to the bisector of the given angle, whereas, in the combination of Figure 125, the rectifying tangent is invariably drawn at 45 degrees, regardless of the extent of the given angle. Incidentally, for the purpose of division *only*, the latter method remains "graphically precise" for any arc of a quadrant not exceeding a radius of 3'-8" actual measurement: the maximum "non detectable" deviation of 1/200th of an inch occurring at about an angle of 7½ degrees for all arcs of the maximum radius stated.

FIGURE 126, Diagram "1":

The line *BCDE* is a compound curve with a straight haunch *DE*. Let's see what we can do with it. First, stretch out the arc *BC* whose center is *A*. The stretch-out is *B'C''* on the tangent drawn perpendicular to the *bisector* of the angle. You know how to do it. Next, develop the other arc *CD*. Add this development, which is *C'D'*, to the tangent *B'C''*, thus making the total stretch-out of the two arcs *B'D''*. Now, from the point *D''*, add the length of the straight haunch *DE* which there becomes *D''E'*. Then *B'E'* is the graphical development of *BCDE*. Now, we'll say, let *B'4* represent *any* distance that you wish to lay off from *B* on the compound haunched curve: or let *E'4* be any such distance that must be laid off from *E*. The problem is: to locate point *4 on the arc*. Simply transfer the distance *D''4* to *D'4*, and then project *4* onto the curve *CD* in the manner with which you should certainly now be familiar. That's all there is to *that* problem! But maybe this haunched curve is half the intrados, say, of a three-centered arch which you desire to divide in some manner—say into five equal parts. Here, then, is a case that could not even be handled by the aboriginal "stepping off" system, since the arcs are of different degrees of curvature, and since a straight line forms a portion of the line to be divided. And in order to do it mathematically, you'd first have to figure the length of the arcs; but in order to figure the lengths of the arcs, you'd have to figure the angles made by their limiting radii; and after you'd figured the arc lengths from the figured angles, and summed up the various increments making

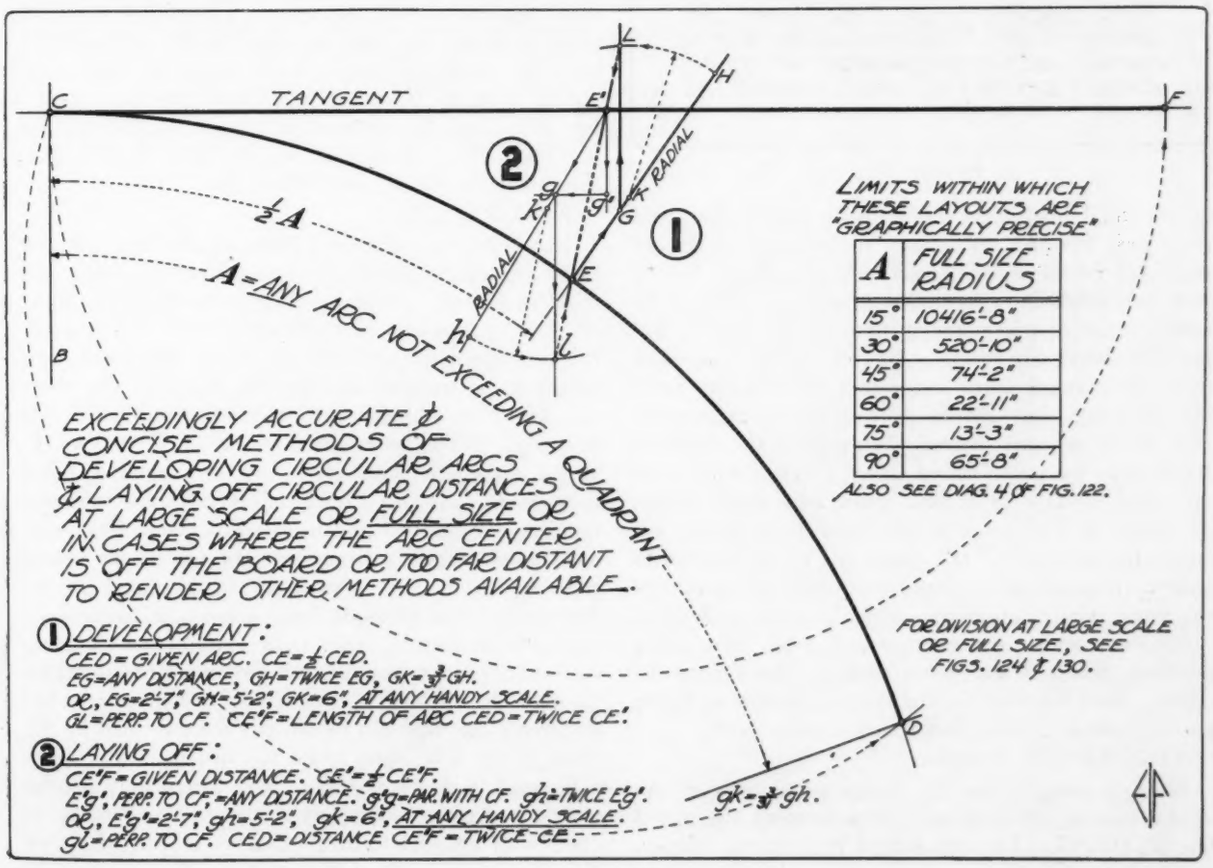

TANGENT
C
E'
F
H
L
RADIAL
RADIAL
½ A
A = ANY ARC NOT EXCEEDING A QUADRANT
B
D
EXCEEDINGLY ACCURATE & CONCISE METHODS OF DEVELOPING CIRCULAR ARCS & LAYING OFF CIRCULAR DISTANCES AT LARGE SCALE OR FULL SIZE OR IN CASES WHERE THE ARC CENTER IS OFF THE BOARD OR TOO FAR DISTANT TO RENDER OTHER METHODS AVAILABLE.
LIMITS WITHIN WHICH THESE LAYOUTS ARE "GRAPHICALLY PRECISE"
A | FULL SIZE RADIUS
15° | 10416'-8"
30° | 520'-10"
45° | 74'-2"
60° | 22'-11"
75° | 13'-3"
90° | 65'-8"
ALSO SEE DIAG. 4 OF FIG. 122.
FOR DIVISION AT LARGE SCALE OR FULL SIZE, SEE FIGS. 124 & 130.
① DEVELOPMENT:
CED = GIVEN ARC. CE = ½ CED.
EG = ANY DISTANCE, GH = TWICE EG, GK = ⅓ GH.
OR, EG = 2'-7", GH = 5'-2", GK = 6", AT ANY HANDY SCALE.
GL = PERP. TO CF. CE'F = LENGTH OF ARC CED = TWICE CE'
② LAYING OFF:
CE'F = GIVEN DISTANCE. CE' = ½ CE'F.
E'g', PERP. TO CF, = ANY DISTANCE. g'g = PAR. WITH CF. gh = TWICE E'g'.
OR, E'g' = 2'-7", gh = 5'-2", gk = 6", AT ANY HANDY SCALE.
gL = PERP. TO CF. CED = DISTANCE CE'F = TWICE CE'.
gk = ⅓ gh.

FIGURE 127

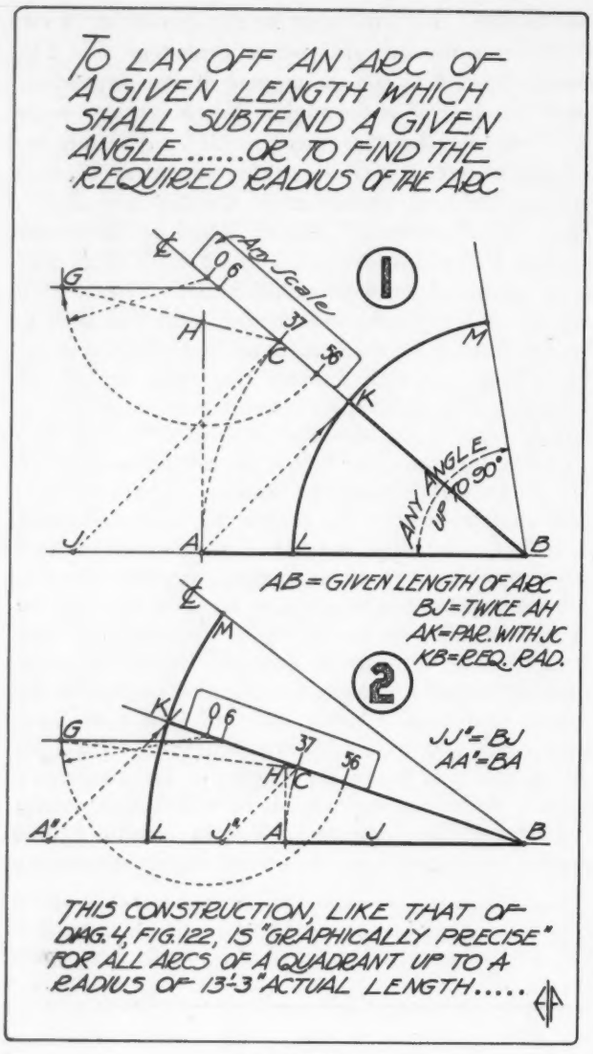

TO LAY OFF AN ARC OF A GIVEN LENGTH WHICH SHALL SUBTEND A GIVEN ANGLE.....OR TO FIND THE REQUIRED RADIUS OF THE ARC
Any Scale
ANY ANGLE UP TO 90°
AB = GIVEN LENGTH OF ARC
BJ = TWICE AH
AK = PAR. WITH JC
KB = REQ. RAD.
JJ' = BJ
AA' = BA
THIS CONSTRUCTION, LIKE THAT OF DIAG. 4, FIG. 122, IS "GRAPHICALLY PRECISE" FOR ALL ARCS OF A QUADRANT UP TO A RADIUS OF 13'-3" ACTUAL LENGTH.....

FIGURE 128

up the total line, then you'd divide this by five, and then start figuring out a way to figure each figured fifth part of the figured line back into place; but by that time you'd have figured yourself into such a decimated array of trigonometry that you'd probably figure you didn't like being a figurehead anyhow—and quit. So here's how to divide that crooked line *without* figuring: Just divide its graphical development *B'E'* in the manner desired, then project the resultant points onto the given mixed line. Points *1* and *2* are projected directly as shown, since they come within the limits of *B'C''*, but points *3* and *4*, occurring between the limits of *C''D''*, must first be transferred to their corresponding developed tangent *C'D'* in exactly the same relative positions—which is easily and accurately done with a paper strip—and, from these latter positions, points *3* and *4* are then projected onto the curve. And the only figuring you've done is to figure yourself out of a job. But here's another one:

FIGURE 126, Diagram "2":

Here, a straight line *DE* is interposed between reversed arcs of different radii, thus forming the mixed line *BCDEFG*. The arcs exceed 90 degrees. Hence, develop the excessive portions, *DC* and *EF*, by first revolving them onto the quadrants, as has heretofore been made clear in Figure 125. Wherefore, on the initial 45-degree tangent line *B'G''*, the direct development of the 90-degree arc, *BC*, is *B'C'*; and the revolved development of the arc *CD* is *C'D'*; and the transferred length of the straight portion, *DE*, is *D'E''*; and the transferred development of the arc *EFG* is *E''G''*. Now you can lay off any distance you please on this grapevine, or divide it in any manner required, by first laying off the divisions on *B'G''* and then, by a virtual reversal of the process of rectification just suggested, project or transfer them to their places on the line *BCDEFG*. Quartering is shown in the Diagram, but it is fully suggestive of the typical process.

FIGURE 126, Diagram "3":

Here, it is required to bisect the unsymmetrical mixed line *BCDE*. First cut the line down by subtracting, directly, the shorter straight length *BC* from *each* end of the total line, which leaves the portion *CDG*. Now, it is evident that, since *EG* equals *BC*, the mid-point of the reduced portion will be the mid-point of the total line. Hence, develop the arc *CD* into the tangent *C'D'*; add thereto, by transference, the straight distance *D'G'* equal to *DG*; bisect *C'G'* at *F'*; project *F'* onto the arc at *F*—or at whatever point it may fall—which point then becomes the required center-point of the mixed line *BCDE*. If the *total* line *BCDE* had been stretched out and bisected, the result would have been identical: the prior reduction of the original line was an expedient which, however, applies to bisection *only*. You can readily see that, to divide the total line *BCDE* into any number of parts except two *equal* ones, then the entire line would have to be straightened out into the tangent line *B'E'*, and the division performed on said rectifying line before projecting, or otherwise transferring, the results to the original mixed line.

FIGURE 127:

Let *D* be *any* point on a given circular arc; and let *C* be any other point on the arc occurring within the same quadrant. How far is it from *C* to *D*, *along the line of the arc*, in feet-and-inches? First, draw the prolonged tangent *CF* on which the given bent line is to be straightened out—so that you can there *measure* it or transfer it to any other portion of the drawing. Next, bisect the given arc *CD* at point *E*, at the same operation producing the required radial through *E*. As you already know from the information given in Parts 7 and 8, the projection of tangents and radials does not necessitate the use of the center from which the arc is swung. So, as noted on the illustration, the methods here given are particularly applicable to arcs of large radii—in full-size detailing for instance. Anyhow, on the prolonged radial drawn through *E*, make *EG* any distance whatsoever, but preferably one that can be directly scale-divided by 31. Then make *GH* equal twice this distance; and make *GK* equal 3/31sts of *GH*. You can readily do this with the decimal scale, but it can just as quickly be done with an architectural scale as follows: Lay off *EG* equal to 2'-7"; *GH* equal to 5'-2"; and *GK*

equal to 6″, at *any* handy scale. The distances are merely *proportions:* not actual measurements. So, now, draw *GL* perpendicular to *CF;* and find *L* with radius *KH* as shown. Cross *CF* at *E′* with the projected line *EL*. Then *CE′* is the rectification of the arc *CE*. Wherefore, twice *CE′*, which is *CF*, is the straightened-out given arc distance *CD*.

Again, in Figure 127, let *CF* represent a given distance which must be laid off, from point *C*, on the given line of the circular quadrant. Make *CE′* equal half this distance—it being unnecessary, therefore, to first lay off the total distance *CF:* the latter being shown merely to make the process graphically understandable and unmistakable. From *E′*, draw the prolonged radial *E′h*, and also draw *E′g′* perpendicular to *CE′*. Lay off *E′g′* equal to 2′-7″, at *any scale convenient;* and, from *g′*, project a line paralleling *E′C* to cross the radial at *g*. Then, at the *same* scale as *E′g′*, lay off *gh* equal to 5′-2″; and *gk* equal to 6″. Draw *gl* perpendicular to *CE′*, which direction must be parallel with *E′g′*, locating *l* with radius *kh* as indicated. Now, a straightedge joining *l* and *E′* will cross the given line of the arc at *E;* whence, the circular distance, *CE*, is the straight length *CE′* bent to the radius of the arc; whence, twice the arc *CE*, which is the arc *CED*, is the given distance *CF* laid off on the given circular line of the quadrant.

The above-given combined method of rectification and laying-off-of circular-distances is practically *exact* for any such layout that can be performed within the limits of the drafting-*ROOM*—as the given tabulated limits indicate. As this table shows, the greatest possible deviation from true rectification occurs in the case of arcs subtending the critical angle of about 75 degrees: and yet, for this critical angle, and for a *full size actual radius of 13′-3″*, the total deviation from the true length of the full 75-degree arc is an unmeasurable .005ths of one inch. On an arc of 45 degrees, it would require a full size radius of 74′-2″ to produce the same theoretical discrepancy. No general method of rectification and laying-off has before been devised that equals this method in simplicity, speed or exactitude. You have, no doubt, discovered the fact that it is the same layout, slightly modified, which has heretofore been recorded at Diagram "4" of Figure 122, and has also been combined in the first three layouts of Figure 123. And now comes *another* embodiment of the same noteworthy fundamental construction:—

FIGURE 128:

In either Diagram, let *LBM* be any given angle up to a full 90 degrees, across which, and limited thereby, it is found necessary to draw a circular arc which shall be of a specified length in feet-and-inches. To put it another way: the length of the arc, and the angle to be subtended by the arc, are given; it is required to determine the radius of the arc. Let the given length of the arc be laid off, in a straight line, as *BA;* *B* being the vertex of the given angle *MBA*. Bisect this angle with the prolonged bisector *BC*, making *BC* equal to *BA*, as shown. With the 37-mark of *any* convenient scale at point *C*, mark off, along the center line of the angle, the proportionate distances indicated on the depicted scale. Or you can do this in the manner just previously shown in Figure 127: calling point *E*, of Figure 127, point *C* of Figure 128. Then, as in Figure 128, draw *6G* parallel with *BA;* and find point *G* with radius *0-56* as shown. Now, from *A*, perpendicular to *AB*, project a line to cross *GC* at point *H*. Make *BJ* equal twice *AH*. Then, as at

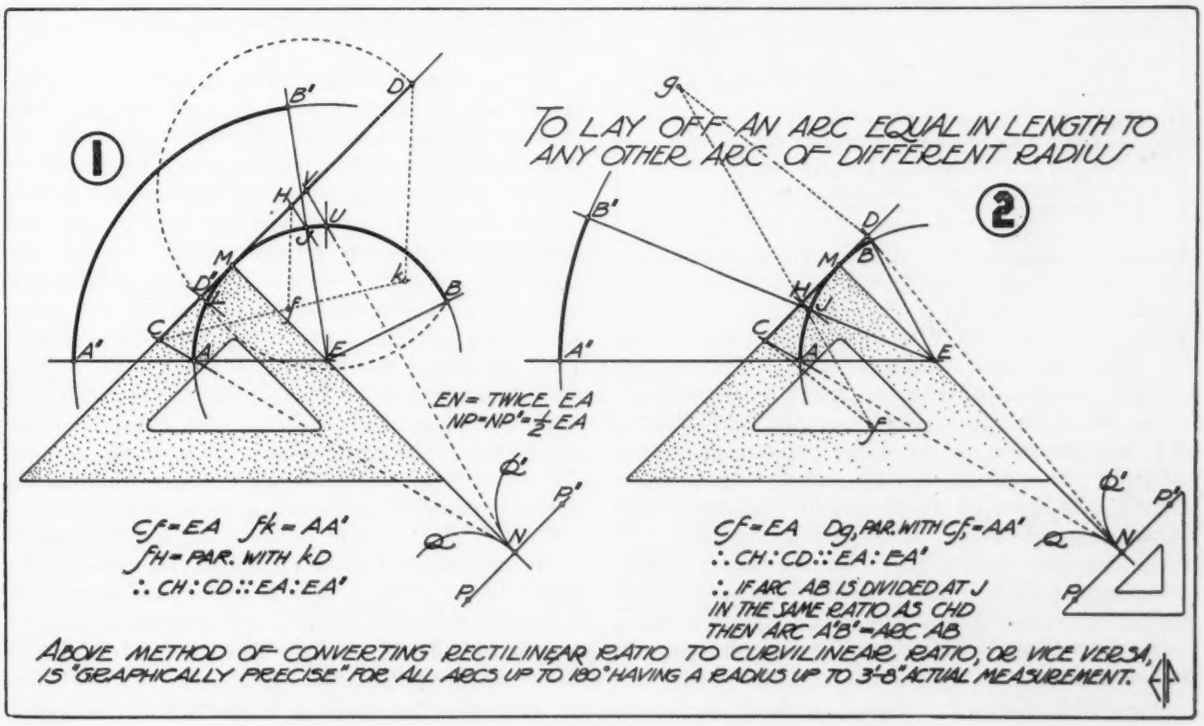

TO LAY OFF AN ARC EQUAL IN LENGTH TO ANY OTHER ARC OF DIFFERENT RADIUS
1
2
EN = TWICE EA
NP = NP′ = ½ EA
Cf = EA fk = AA′
fH = PAR. WITH kD
∴ CH : CD :: EA : EA′
Cf = EA Dg, PAR. WITH Cf, = AA′
∴ CH : CD :: EA : EA′
∴ IF ARC AB IS DIVIDED AT J IN THE SAME RATIO AS CHD THEN ARC A′B′ = ARC AB
ABOVE METHOD OF CONVERTING RECTILINEAR RATIO TO CURVILINEAR RATIO, OR VICE VERSA, IS "GRAPHICALLY PRECISE" FOR ALL ARCS UP TO 180° HAVING A RADIUS UP TO 3′-8″ ACTUAL MEASUREMENT.

FIGURE 129

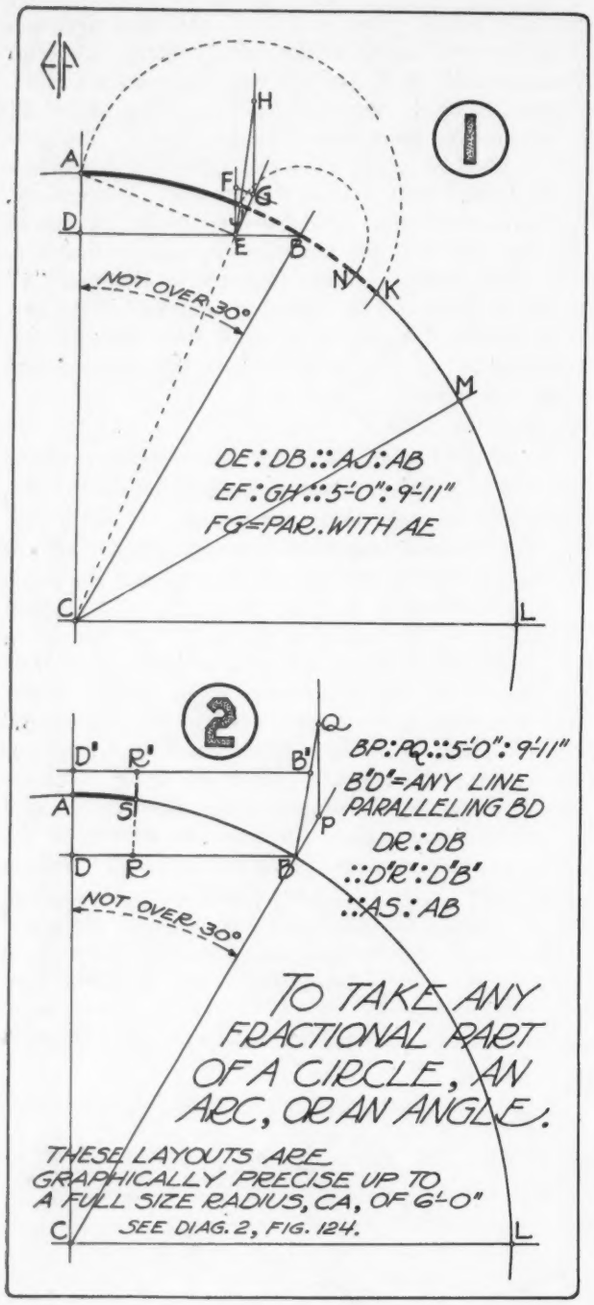


FIGURE 130

Diagram "1," project *A* to *K*, in a direction paralleling *JC*. Or, as at Diagram "2," if this direction makes a too acute angle for accurate and definite intersection at *K*, then just double or triple both *BJ* and *BA*, thus determining the still-properly-related points *A'* and *J'*; then project *A'* to *K* in a direction paralleling *J'C*. Whence, in either case, *BK* becomes the resultant required radius. So the then-drawn arc *LKM*, subtending the given angle, is the curvilinear equivalent of its rectilinear representation *BA*—subject to the limiting conditions stated in the Figure, which, as far as practical drafting is concerned, *are no limitations at all.*

FIGURE 129:

In either Diagram, call *AB* a given arc of radius *EA*; and assume the necessity of laying off the length of this arc on another circular line of a differing radius *EA'*. In accordance with the method heretofore given at Figure 125, develop the arc *AB* into the rectifying 45-degree tangent *CD*, as here shown. Then, as at Diagram "1," on *any* suitable line not paralleling *CD*, make *Cf* equal *EA*; and make *ck* equal *EA'*, which latter makes *fk* equal *AA'*. Project *f* to *H*, in a direction paralleling *kD*; and project *H* to *J* via a tangent line to *Q'*. Project *J* to *B'* by a radial from *E*. Then the resultant arc *A'B'* is the other arc *AB* bent to the radius *EA'* as required. Or, as at Diagram "2," make *Cf*, in any suitable direction other than parallel with *CD*, equal to *EA*; and make *Dg*, in a direction paralleling *fC*, equal to *AA'*. The line *fg* now locates *H* on *CD*. Hence, as before, project *H* to *J*, and *J* to *B'*. Whence, as before, the arc *A'B'* is the graphical equivalent of the given arc *AB*. But maybe the *given* arc is *A'B'*—the larger in radius. Then, referring to Diagram "1," reverse the above alchemy as follows: Draw an extended arc with the lesser radius from the same center *E*; project *B'* radially to *J* on this prolonged arc-line of radius *EA*; develop the resultant arc *AJ* into the portion, *CH*, of the 45-degree tangent drawn through the 45-degree point *M*; and lay off *Cf* and *Ck* as before. Now project *k* to *D*, in a direction paralleling *fH*, and establish the 90-degree limit *V* of the development along *CD* as indicated. Make *VD'* equal *VD*; project *D'* to *L* by a line tangent to *Q*; and make *UB* equal *UL* as shown. Whence, *AB* is the required arc-length equivalent to the given arc-length *A'B'*—or so closely such that you would have a terribly involved time trying to figure it otherwise! The reversal of the transformation for the case shown at Diagram "1" is more simple, and obvious—since *neither* of the arcs exceed an angle of 90 degrees.

FIGURE 130:

Here, two methods are shown for taking any fractional part of a circle, or an arc, or an angle. This is often convenient in full-size detailing, etc., where the curvilinear extent of but one repeating unit is required. Obviously, it is also applicable to the finding of the length of one side of any regular polygon. Both methods produce identical results, and both are founded on the basic construction given at Diagrams "1" and "2" in Figure 124.

At Diagram "1," let it be required to cut off, say, 12/17ths of the arc *AB*, which latter does not subtend an angle greater than 30 degrees. Draw *BD* at right angles to *CA*; and make *DE* equal 12/17ths of this straight line, or, which is the same thing, make *BE* equal 5/17ths of the same line. Through *E*, draw the radial *EG* and the perpendicular *EF*, making *EF* equal 5'-0" at *any* handy scale, and locating *G* by a line projected from *F* in a direction paralleling *AE*. Then, at the *same* scale as *EF*, and paralleling *EF*, make *GH* equal 9'-11". A straightedge aligned with *H* and *E* will cross the given arc *AB* at *J*, thus slicing off the portion *AJ* equalling 12/17ths of *AB*, as required—no graphically-detectable discrepancy occurring for any radius, *CD*, up to a full six feet in

actual length. Now assume that the arc *AM* exceeds 30 degrees, but does not exceed twice 30; and that it is *bisected* at point *B*. Then, by revolving *A* about *J* to *K*, the arc *AK* becomes 12/17ths of the last-given arc *AM*. Again, let it be required to take, say, 22/51sts of the quadrant arc *AL*. Well, 22/51sts of a quadrant is 22/17ths of a 30-degree arc; and 22/17ths of a 30-degree arc is a 30-degree arc *plus* 5/17ths of itself. Wherefore—since *BJ* has been found by taking 5/17ths of the now-assumed 30-degree arc *BA*—revolve *J* about *B* to *N*, which simple manipulation makes the arc *AN* equal to 22/51sts of the quadrant *AL*, as required. Finally, as an absolutely *general* case, let it be necessary to lay off, say, 1/17th of a full *circumference*, which portion naturally, is bound to be the same fractional part of 360 *degrees*. The radius *CA* is given, or assumed; the center, *C*, being on the board or off—it's of no consequence. Now, it is certainly a very rudimentary "mathematical" process to deduce the fact that 1/17th of a circle, or any *other* fractional part of a circle, *is just 12 times that particular fractional part of a 30-degree arc.* In other words, it is extemporaneously-arrived-at that the required 1/17th of a circle is 12/17ths of a 30-degree arc or angle. The rest is just as—extemporaneously-arrived-at: locate the 30-degree point, *B;* take a dozen seventeenths of the thus-limited arc *AB*, and it will be *AJ*, the required *one* seventeenth of a *circle* having the given radius *CA*. And if you joined *A* and *J* by a straight line, then this straight line would be one side of a—hep—hep—heptadecagon. So, you see, by using the 30-degree arc as a *gauge*, you can quickly and accurately materialize any piece of "pi" you crave.

The method of "slicing" shown at Diagram "2," of Figure 130, is particularly suitable to very small fractional parts, and may, on occasion, prove more expeditious and more precise in execution than the method of Diagram "1." In the case depicted at Diagram "2"—which is typical of the general process—it is required to take 1/11th of the quadrant arc *AL*. It is, of course, unnecessary to draw the entire quadrant for this purpose: it is necessary to draw only the 30-degree extent of same, which is here assumed as the arc *AB*. Well, 1/11th of 90 degrees is assuredly 3/11ths of 30 degrees. Hence, from the 30-degree point *B*, draw *BD* at right angles to *CA*, and draw the radial *BP*. Then, at *any* handy scale, locate the point *P* at a distance of 5′-0″ from *B*, and locate *Q*, in a direction at right angles to *BD*, at a distance of 9′-11″ from the point *P*. If you'd rather, you can use the *decimal* scale, and call these same distances 60 and 119, respectively. Now draw *QB* and *B′D′*, the latter being *any* line paralleling *BD* and limited as shown. Make *DR* equal 3/11ths of *DB;* and make *D′R′* the same fractional part of *D′B′*. This establishes the slope of the slicing-line *R′R;* thus cutting off the arc *AS* which, because it is 3/11ths of the 30-degree arc *AB*, is the required 1/11th of the quadrant arc *AL*. Of course, if the total arc to be subjected to any of the aforementioned surgical operations does not, in itself, *exceed* 30 degrees, then the slicing can be done without magnification of the given fraction: that is, if the arc *AB*, say, were an arc of *less* than 30 degrees—any amount less, regardless of its particular *angular* designation—merely draw the line *BD*, perpendicular to *CA*, through the limiting arc-point *B*, and proceed as before, dividing *BD* and *B′D′* each in the identical manner required for the given arc.

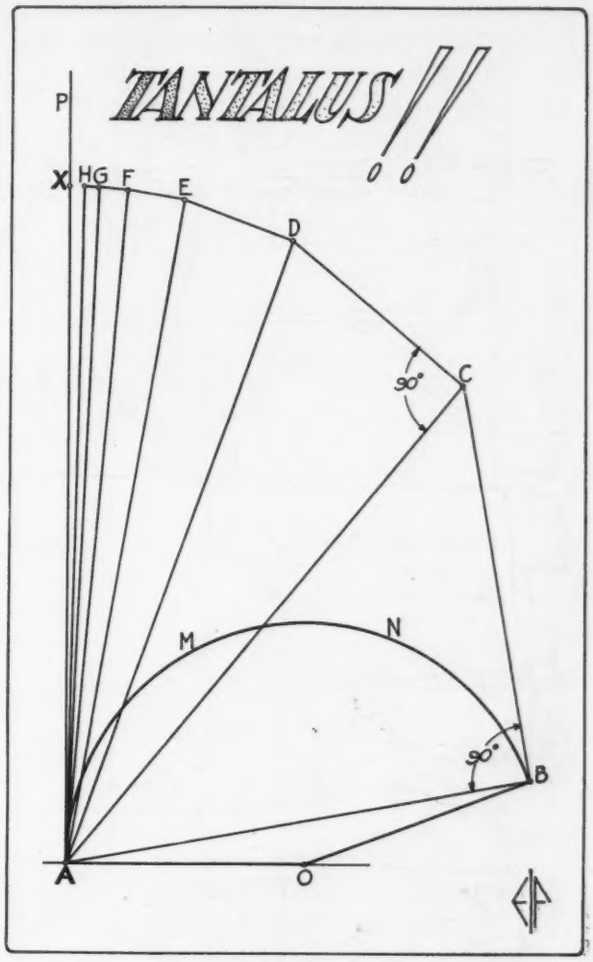


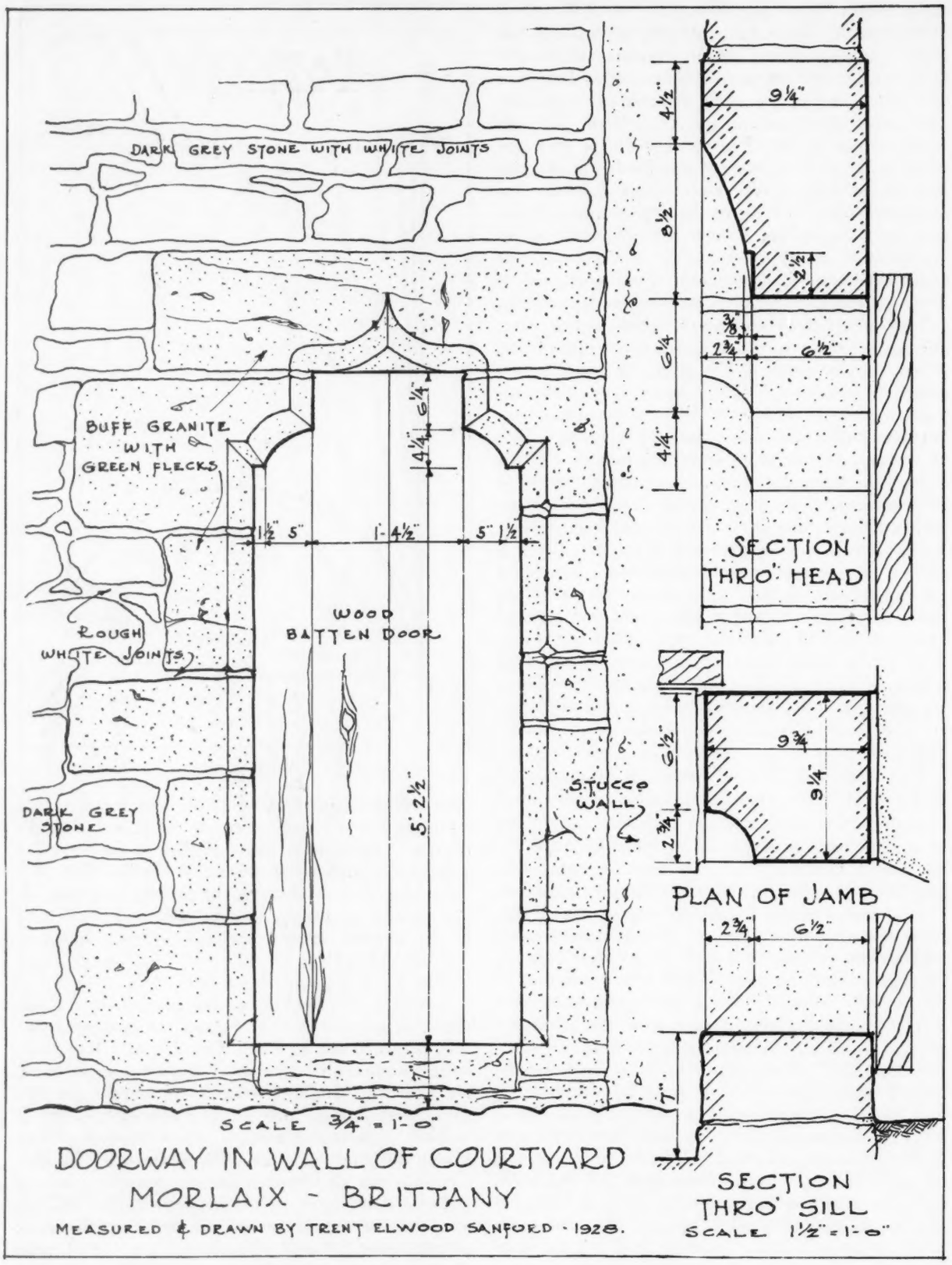
FIGURE 131

FIGURE 131:

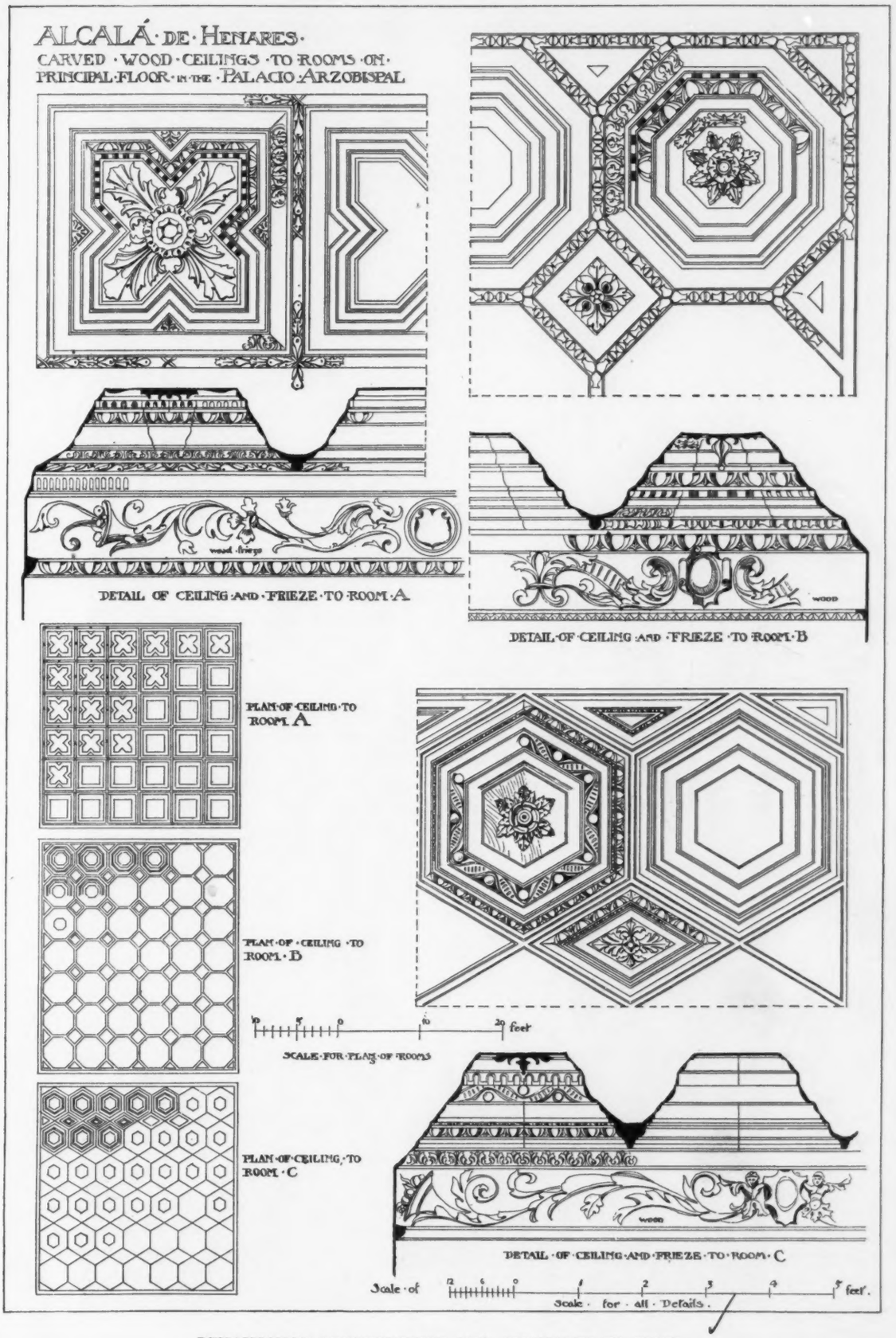
The secret of the circle—*at last!*

Let the arc *AMNB* be *any* portion of a semicircle, of *any* radius *OA*. Draw the prolonged line *AP*, perpendicular to *OA*. On *AB*, as a base, construct a right-angled triangle, *ABC*, whose hypotenuse, *AC*, bisects the angle between its base and the line *AP*. On the resultant hypotenuse, as a new base, construct another right-angled triangle whose hypotenuse also bisects the angle between *its* base and the line *AP*. Continue this kindergarten pastime—that is, just keep right on doing it—until the irregular outline *BCDE*, *etc.*, *etc.*, of the figure you are building, meets the perpendicular *AP* at *X*. Simple—isn't it? And *when* you have accomplished this, then will *AX* be the *exact* length of the arc *AMNB*. And if this arc were a full semicircle of unit radius, then *AX* would be "pi"—exactly so! No doubt, this simple construction will remain *everlastingly* famous. Try it and see.

In Part 15, *applied cyclometry goes on the boards.*



FROM A MEASURED DRAWING BY TRENT ELWOOD SANFORD


ALCALÁ · DE · HENARES ·
CARVED · WOOD · CEILINGS · TO ROOMS · ON ·
PRINCIPAL · FLOOR · IN THE · PALACIO ARZOBISPAL
wood · frieze
DETAIL OF CEILING AND · FRIEZE · TO ROOM · A
wood
DETAIL · OF · CEILING · AND · FRIEZE · TO · ROOM · B
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wood
DETAIL · OF · CEILING · AND · FRIEZE · TO · ROOM · C
Scale · of 12 6 0 1 2 3 4 5 feet.
Scale · for · all · Details.

RENAISSANCE ARCHITECTURE AND ORNAMENT IN SPAIN

A PLATE FROM THE WORK BY ANDREW N. PRENTICE

PENCIL POINTS FOR JANUARY, 1931
VOLUME XII NUMBER 1

"This palace contains a magnificent suite of five apartments, the ceilings of which, said to be designed by Berruguete, are the subject of this plate. The work is in a splendid state of preservation; the height is about eighteen feet from the floor and the material is dark walnut. The carvings display much variety of design and detail, and are amongst the purest of their kind in Spain. Several of the rooms are enriched with deep ornamental plaster friezes, placed below the wooden carved frieze."

A. N. PRENTICE.

FROM A DRYPOINT BY CHESLEY BONESTELL
"NUMBER ONE WALL STREET"

PENCIL POINTS FOR JANUARY, 1931
VOLUME XII NUMBER 1

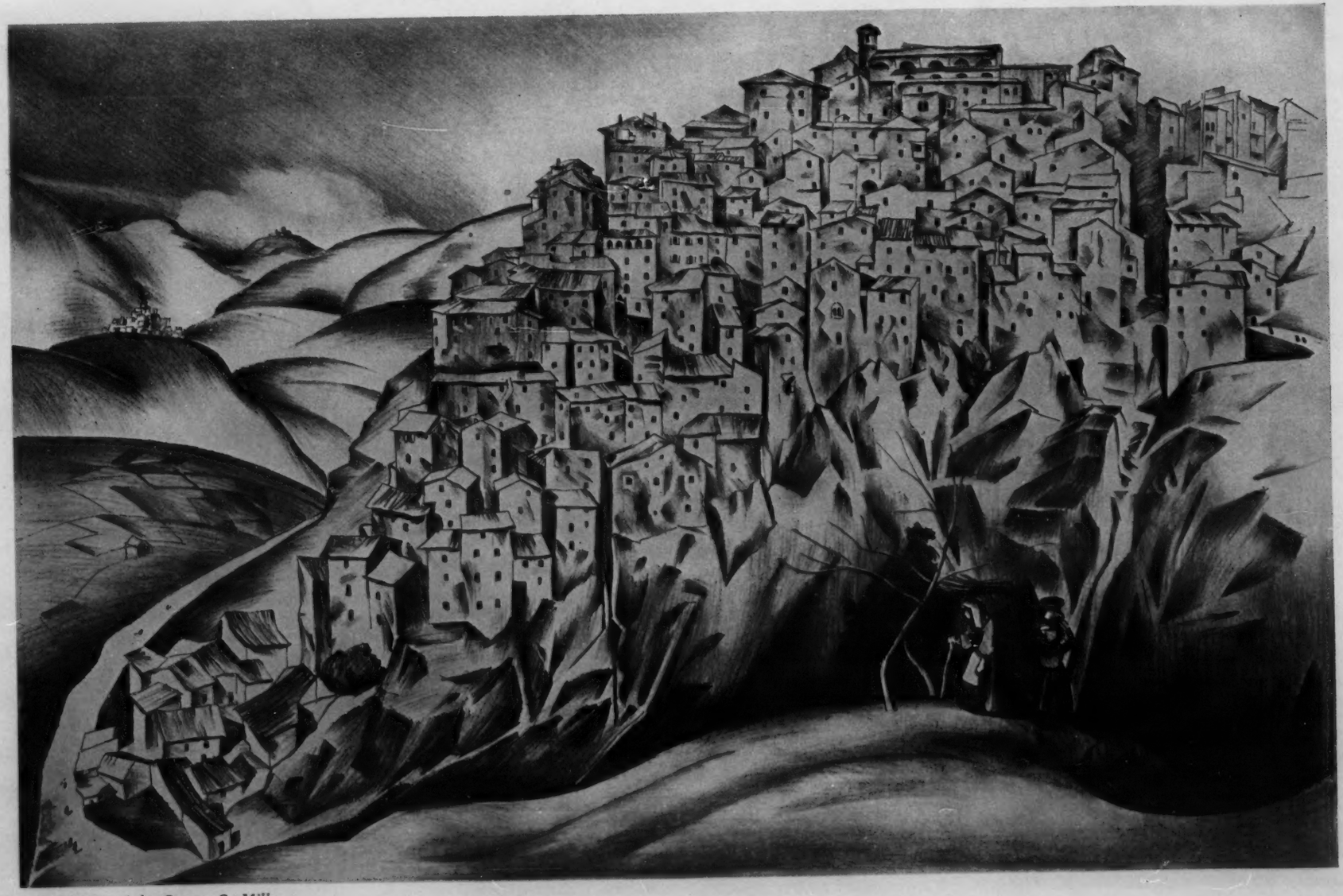
This recent drypoint by Chesley Bonestell shows the Irving Trust Company's new building at 1 Wall Street, New York, as seen from the churchyard of Trinity. As everyone knows, the architects for the new building were Voorhees, Gmelin, and Walker. The original print measures 7" x 13".

BRONX SOLDIERS' MEMORIAL, PELHAM BAY PARK, NEW YORK—JOHN J. SHERIDAN, ARCHITECT

FROM A RENDERING IN OIL COLOR BY CHESLEY BONESTELL

PENCIL POINTS SERIES
of
COLOR PLATES

The rendering of the war memorial shown on this plate was executed on a fine grain absorbent canvas similar to shade cloth. After the drawing was laid out in pencil the masses were laid in with water color which gave a texture visible in the road and grass and in the trees of the background. Thin glazes of oil were then used to heighten the color and even the tone. The sky was painted in with pure oil paint. The original measures about 30" x 20".



Original printed by George C. Miller

FROM A LITHOGRAPH BY FRANK SCHWARZ

A VIEW OF ANTICOLI-CORRADO FROM THE ADJACENT HEIGHTS

PENCIL POINTS FOR JANUARY, 1931
VOLUME XII NUMBER 1

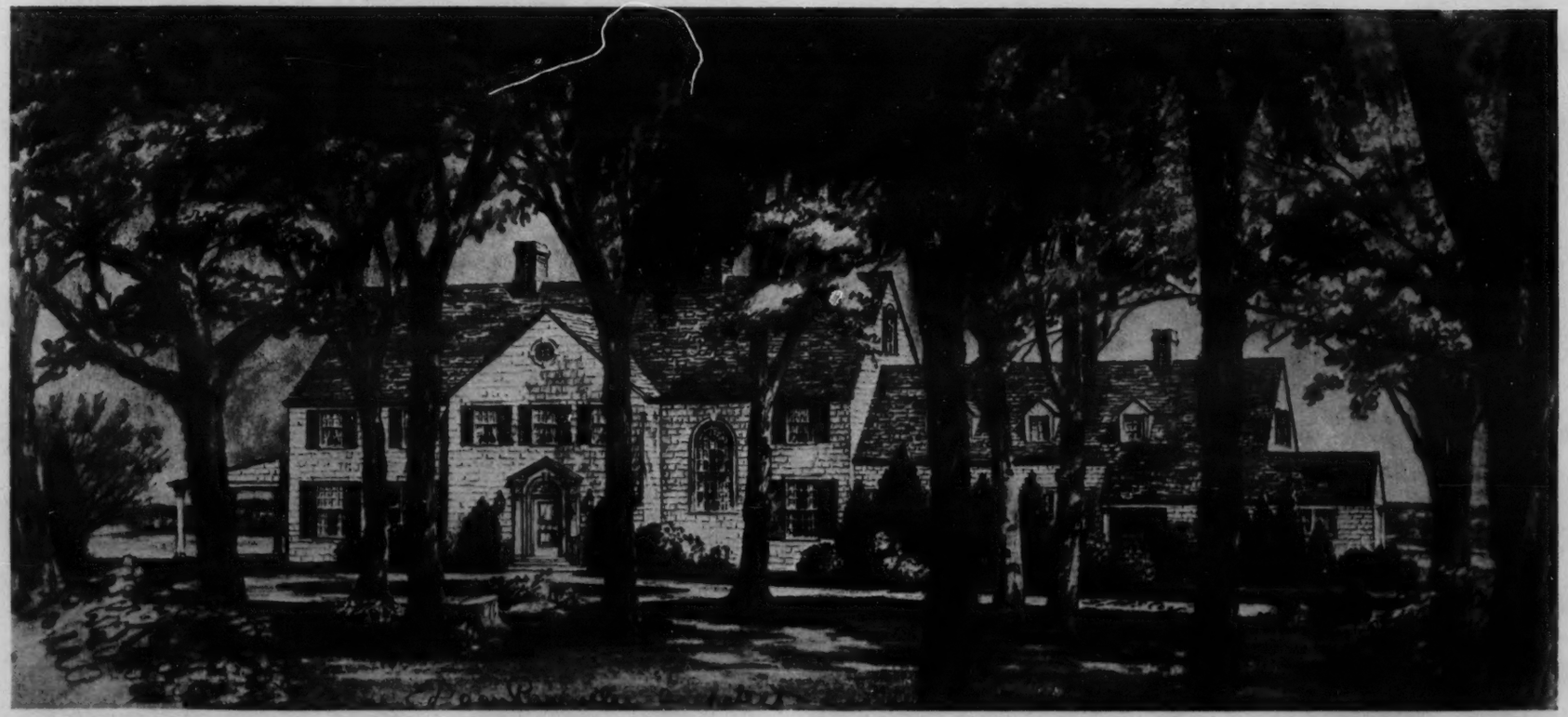
This print is one of a series of lithographs recently drawn on stone by the artist from sketches made in 1927 during his residence in Anticoli-Corrado, near Subiaco, Italy, as holder of a Guggenheim Fellowship. The original measured 18¼" x 12".

FROM A PENCIL SKETCH BY FRANCIS S. SWALES

MARKET CROSS, CHICHESTER, ENGLAND

PENCIL POINTS FOR JANUARY, 1931
VOLUME XII NUMBER 1

The sketch shown on this plate was done by Francis S. Swales while he was living in England in 1906. An article on Mr. Swales' work appeared in the September, 1930, issue of PENCIL POINTS.



FROM A PENCIL RENDERING BY JOSEPH McCOY

HOUSE FOR RODNEY S. JARVIS, ESQ., GREAT BARRINGTON, MASSACHUSETTS—E. DEAN PARMELEE, ARCHITECT

FROM SKETCHES MADE ON THE SPOT AT THE CALIFORNIA MISSION PLAY

MR. KAMPS MADE HUNDREDS OF NOTES SUCH AS THESE, MOST OF THEM IN COLOR

Some Notes on the Mission Play

By Norman H. Kamps

The California Missions were rapidly falling into decline when, for the benefit of those who loved the past, as a child its parent, there was conceived an author playwright. That man was John Stephen McGroarty, creator of the Mission Play, which is the story of the early California, land of Dons and Senoritas and the home of one of the happiest cultures the world has ever known.

The Mission Play is an annual event and runs for a lengthy season each year. It has been presented over 3,000 times and is a success in every way, including financially. It is housed in its own typically Spanish Theatre at San Gabriel. In one of the patios may be seen small replicas of all the California Missions. The proceeds of the play are devoted to the preservation of the Missions and a proud son thus pays homage to his Mother.

The time is at hand for architects to design theatres for historic plays for every State in the Union—theatres that will spring from their very environment with kinship to the soil and climate on which they grow. The plays will reenact the pioneer days, with home talent. The southland will create a new and greater *Uncle Tom's Cabin* and the architectural motif of the theatre will be cotton and slavery and the music and song will be the negro spirituals. Wisconsin will build her theatre with an uncut forest as the motif. The characters will be lumberjacks, Indians, Father Marquette —and the songs will be derived from the winter winds and the silence of the maple sap in springtime and from the breaking of ice from the storm-tossed land of lakes. Genius will capture the voice of nature and the spirit and breath of the early settlers and then release them in a poem, a song, and a book, and a play, and a theatre.

Somewhere between Atlanta and the sea is created, in the mind's eye, a theatre which will teach history to young and old in the form of a great annual Civil War Drama. Each State will have its playhouse for historic plays and we will hold communion with the past and man's continuity will not be lost. Archæologists are concerning themselves with linking the far yesterday to today; they are patching up what was sometimes ruthlessly destroyed. Their fine minds are busy establishing what might already exist, namely the secret of the buried ages gone by. They are repairing breaks in the rear of the column of life's endeavors.

History will furnish us the themes for the localized historic plays and past history must frequently rely on archæology for facts.

What John Stephen McGroarty has done for California will be done for other parts of the country and the tourist will be enabled to see plays and hear stories of the past in the splendid way that is possible at the San Gabriel Mission Playhouse where he may become familiar with the very essence of California history in the space of just a few hours.

RHYTHMIC MOTIVE FROM THE CALIFORNIA MISSION PLAY

REPRODUCED FROM THE NOTEBOOK OF NORMAN H. KAMPS

NOTES ON THE CALIFORNIA MISSION PLAY FROM THE SKETCHBOOK OF NORMAN H. KAMPS

SEE COLOR PLATE IN THIS ISSUE FOR A COMPOSITION WORKED UP FROM THESE AND SIMILAR SKETCHES

THE MISSION PLAY, SAN GABRIEL, CALIFORNIA

FROM A COLOR STUDY FOR A MURAL DECORATION BY NORMAN KAMPS

PENCIL POINTS SERIES
of
COLOR PLATES

This careful study for a mural decoration is based on the famous Mission Play, given annually at the San Gabriel Mission in California. It is one of a series designed by the artist who has made a long study of the play and was worked up from notes taken directly from the play as it was being acted. Elsewhere in this issue will be found reproductions in black and white taken from pages in Mr. Kamp's notebook, together with a short article concerning the play. The drawing shown here measured 12¼" x 8¼" and was outlined in ink and painted in with clear washes of transparent water color.

Competition for the Worcester Memorial Auditorium

Winning Designs and Report of the Jury of Award

Invitations were extended to twenty-one architects of Worcester, Boston, and New York to submit designs in the competition for the New Municipal Memorial Auditorium for Worcester, Massachusetts. Eighteen architects accepted the invitation. The drawings were judged by a Jury of Award consisting of three architects, Charles D. Maginnis of Boston, F. Ellis Jackson of Providence, and J. Frederick Larson of Hanover, N. H., and two lay members, George F. Booth and George N. Jeppson of Worcester.

The design by Lucius W. Briggs of Worcester, associated with Frederic C. Hirons of New York, won the first place; second place and $1,500 went to J. D. Leland Company of Boston and Worcester; third prize of $1,250 was given to the design submitted by Henry and Richmond of Boston; the fourth prize of $1,000 went to Jasper Rustigian of Worcester, associated with Will Rice Amon of New York. All these four designs are shown herewith. The auditorium is to be erected "as a Memorial to Soldiers, Sailors, and Marines."

The Problem

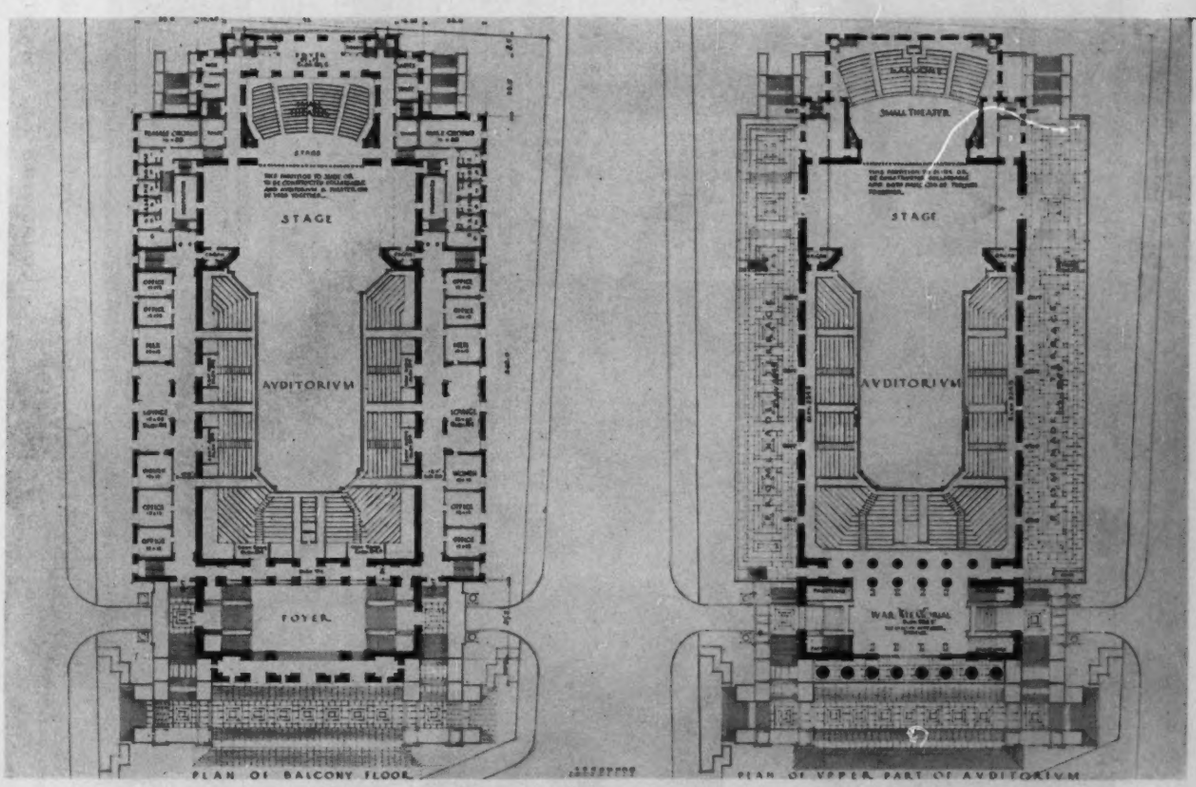
The chief essentials of the building in the order of their size are as follows:—(a) A Large Auditorium or Hall; (b) A Small Hall; (c) A Memorial Hall or Chamber; (d) Offices, Cloak Rooms, Toilet Rooms, Ticket Rooms, etc.; (e) Corridors and Entrance Halls; (f) Boiler Room, etc.; and (g) Kitchen, etc.

(a) The Auditorium is to be used for concerts, dramatic performances, conventions and school commencement exercises.

For these and perhaps for other occasions a wooden sloping floor (to be removable) must be provided. The hall will also be used for pageants, exhibition drills, and so on. For these occasions the permanent level floor will be required and provision for storing the removable floor and the seats attached thereto must be made, probably in a basement directly under the permanent floor, with trap doors in the latter. For purposes of cubing assume this basement floor to be 9′0″ below level of permanent floor of auditorium. (Mandatory.)

The auditorium should seat, approximately, 4,000 persons, of which not over forty-five per cent may occupy the balconies, and less if possible. The hall shall not be less than sixty-five feet (65′) high from floor to highest portion of ceiling.

(Continued on page 62)

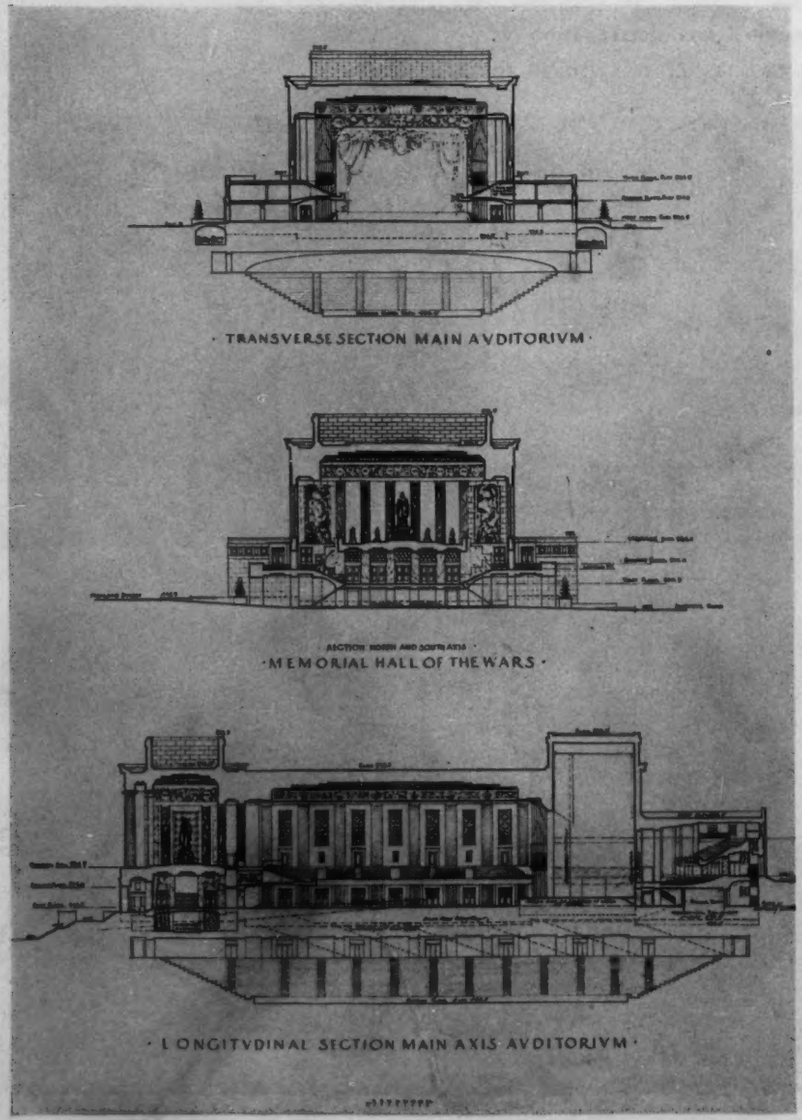


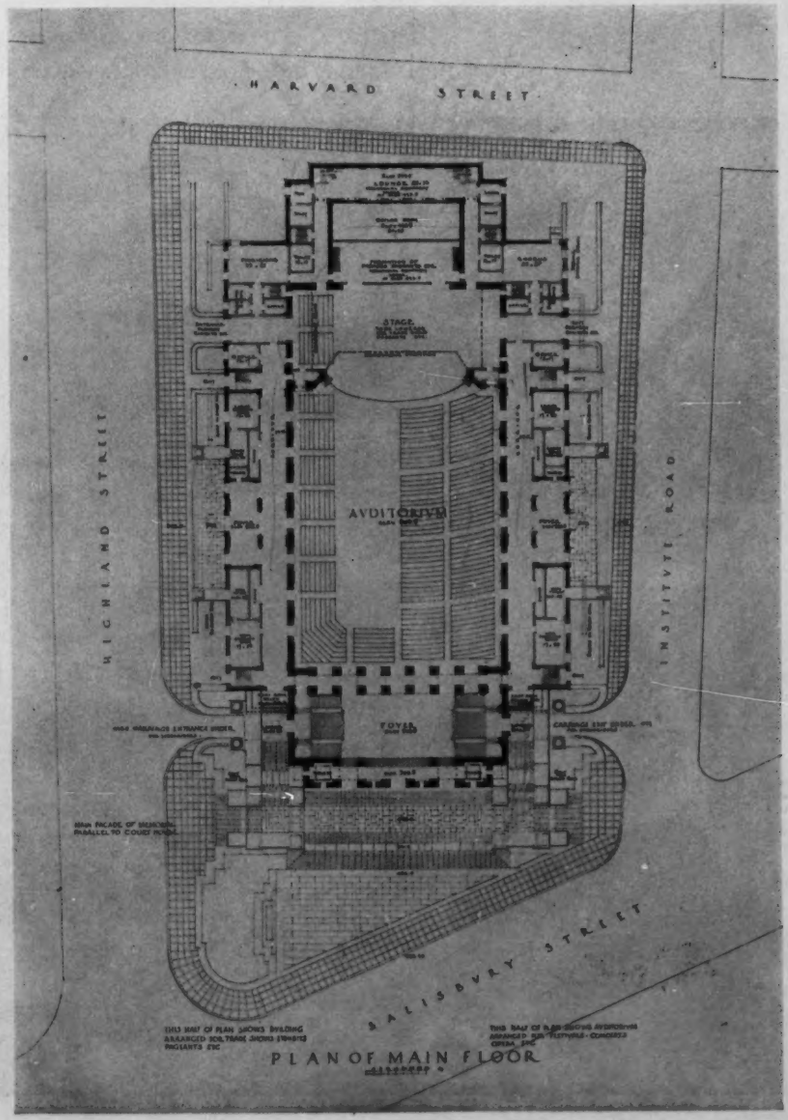
PLANS OF WINNING DESIGN BY LUCIUS W. BRIGGS ASSOCIATED WITH FREDERIC C. HIRONS

COMPETITION FOR WORCESTER MUNICIPAL MEMORIAL AUDITORIUM

PERSPECTIVE OF WINNING DESIGN BY LUCIUS W. BRIGGS OF WORCESTER, MASS., ASSOCIATED WITH FREDERIC C. HIRONS OF NEW YORK

COMPETITION FOR WORCESTER MUNICIPAL MEMORIAL AUDITORIUM



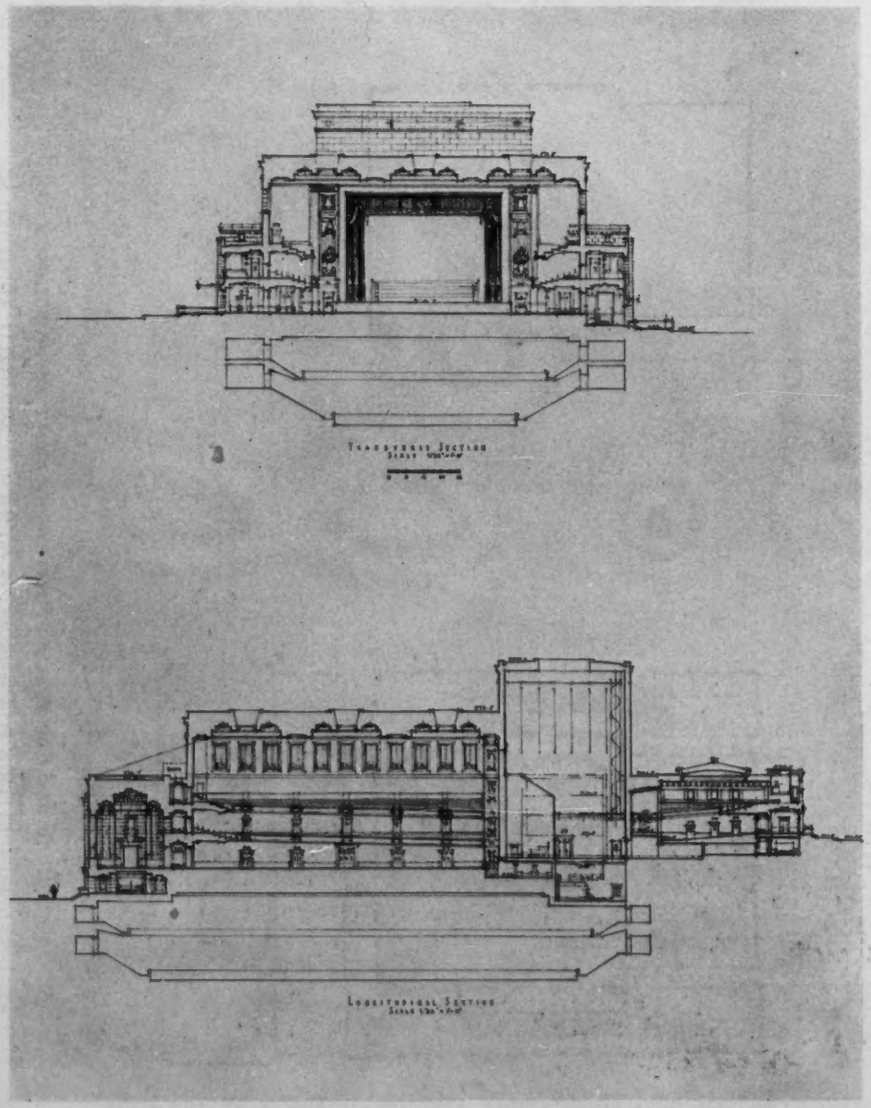


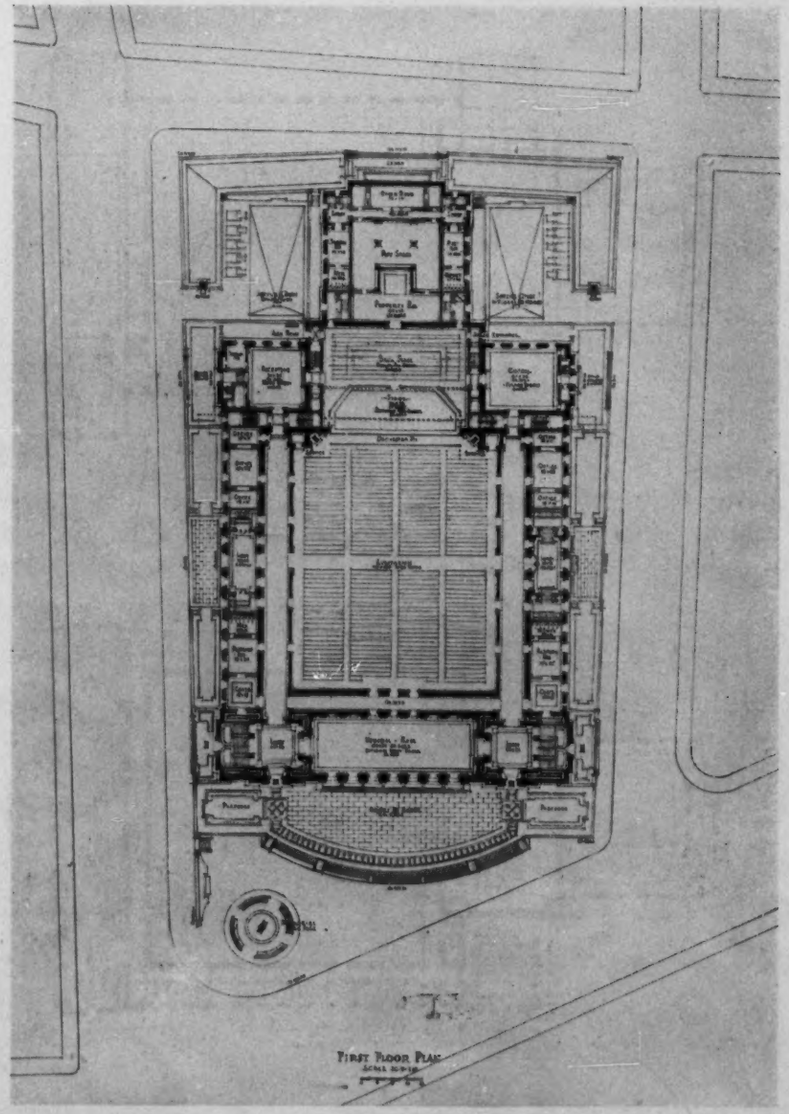
SECTIONS AND MAIN FLOOR PLAN OF WINNING DESIGN BY LUCIUS W. BRIGGS OF WORCESTER, ASSOCIATED WITH FREDERIC C. HIRONS OF NEW YORK

COMPETITION FOR WORCESTER MUNICIPAL MEMORIAL AUDITORIUM

PERSPECTIVE OF DESIGN PLACED SECOND, BY J. D. LELAND COMPANY OF BOSTON AND WORCESTER

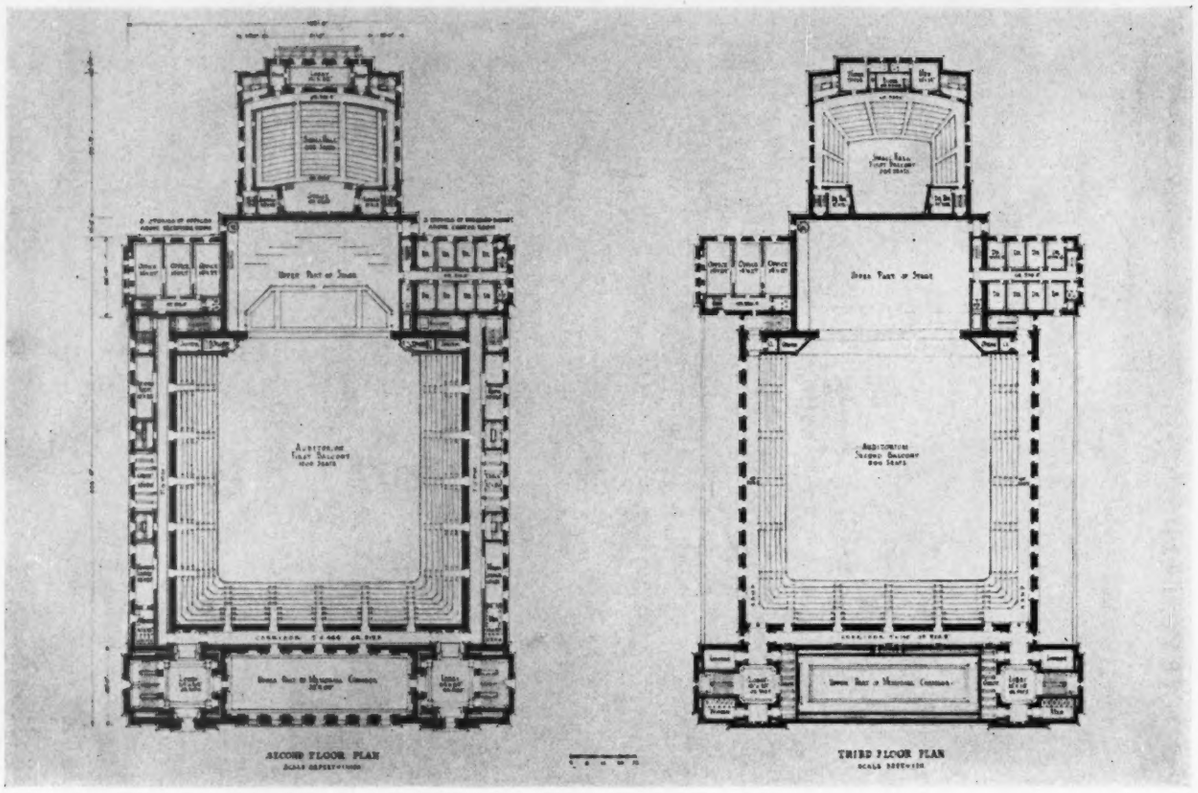
COMPETITION FOR WORCESTER MUNICIPAL MEMORIAL AUDITORIUM



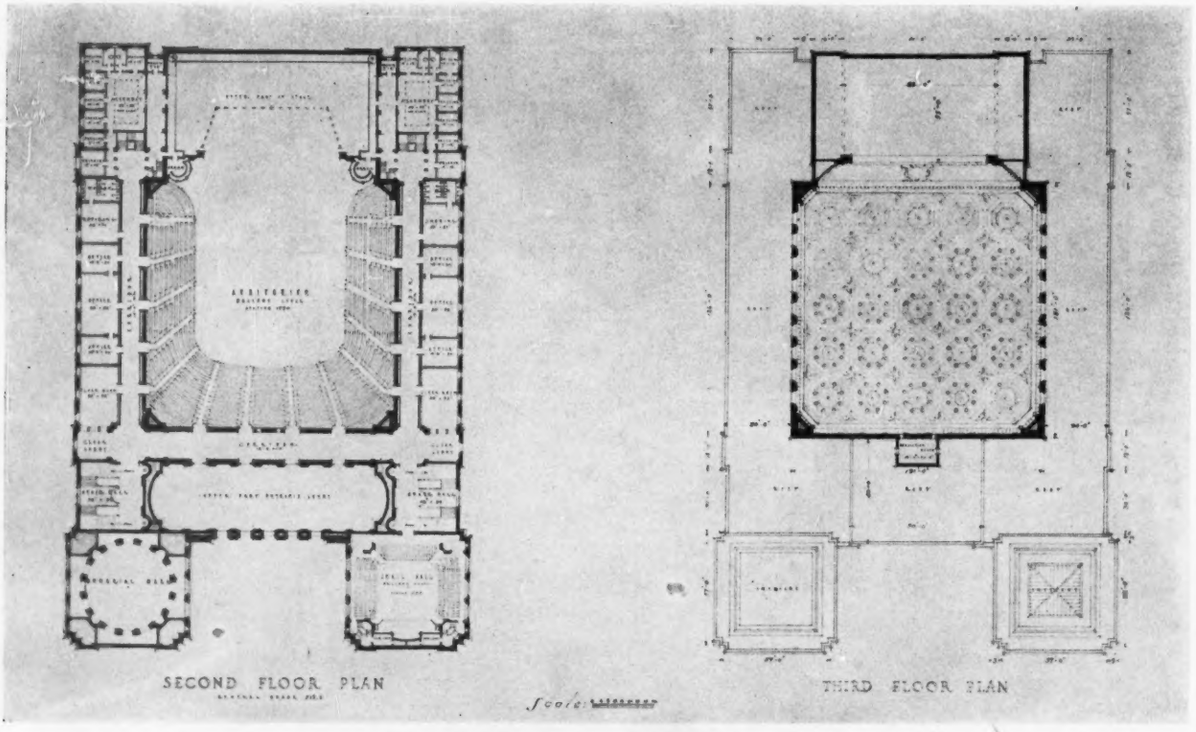


SECTIONS AND FIRST FLOOR PLAN OF DESIGN PLACED SECOND, BY J. D. LELAND COMPANY OF BOSTON AND WORCESTER

COMPETITION FOR WORCESTER MUNICIPAL MEMORIAL AUDITORIUM

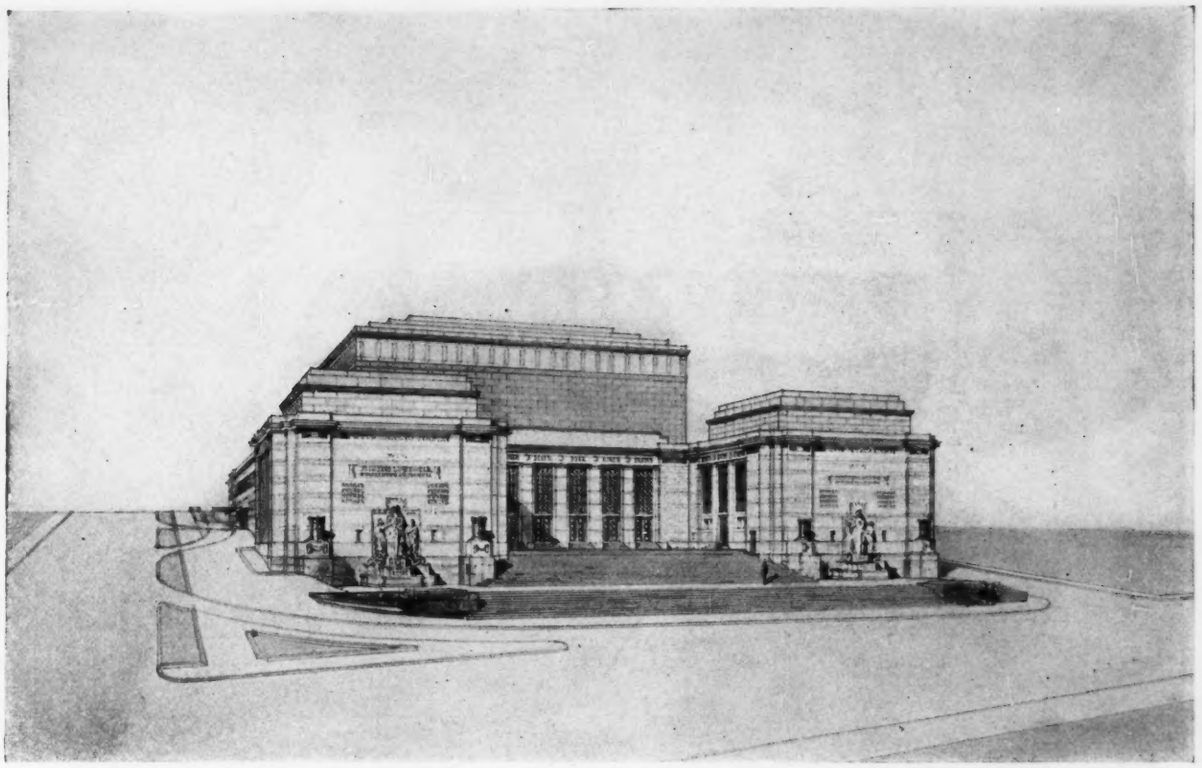


PLANS OF DESIGN BY J. D. LELAND COMPANY OF BOSTON AND WORCESTER

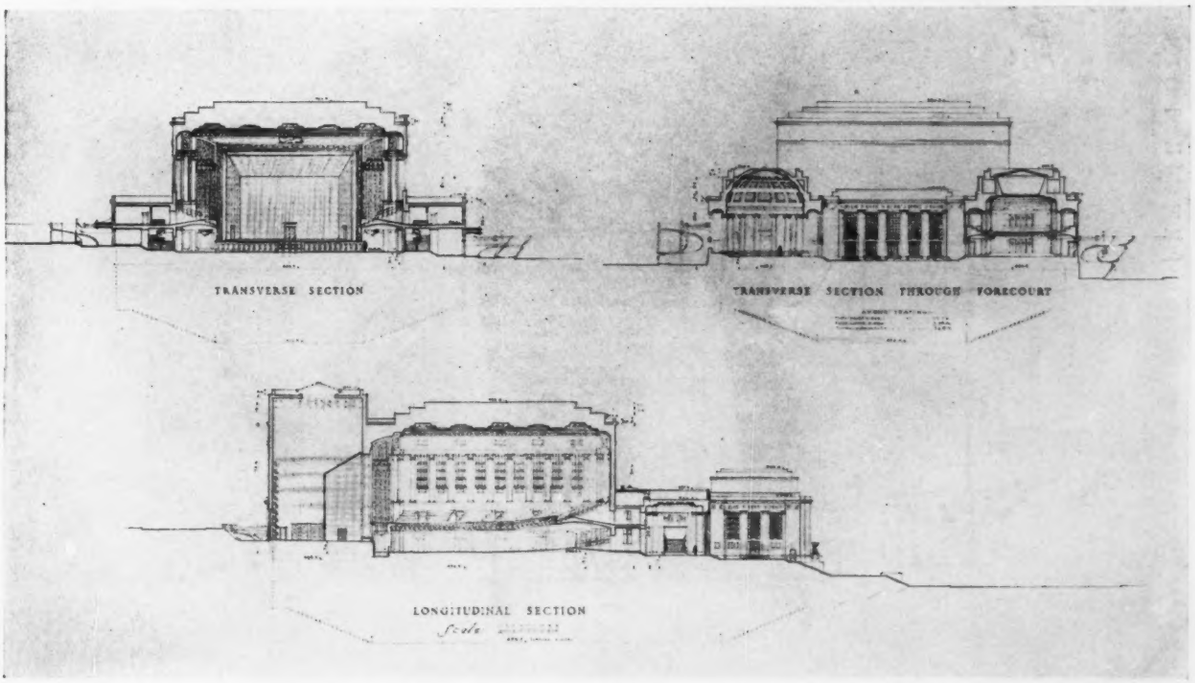


PLANS OF DESIGN BY HENRY AND RICHMOND OF BOSTON

COMPETITION FOR WORCESTER MUNICIPAL MEMORIAL AUDITORIUM

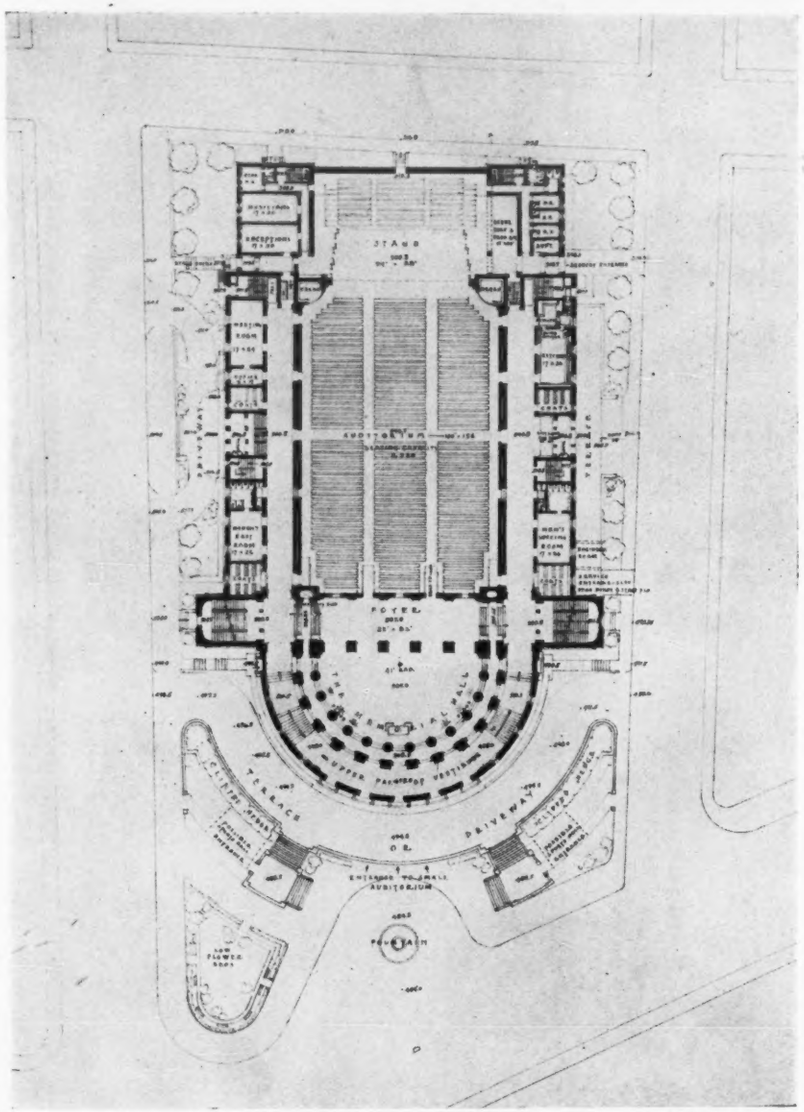


PERSPECTIVE OF DESIGN PLACED THIRD, BY HENRY AND RICHMOND OF BOSTON

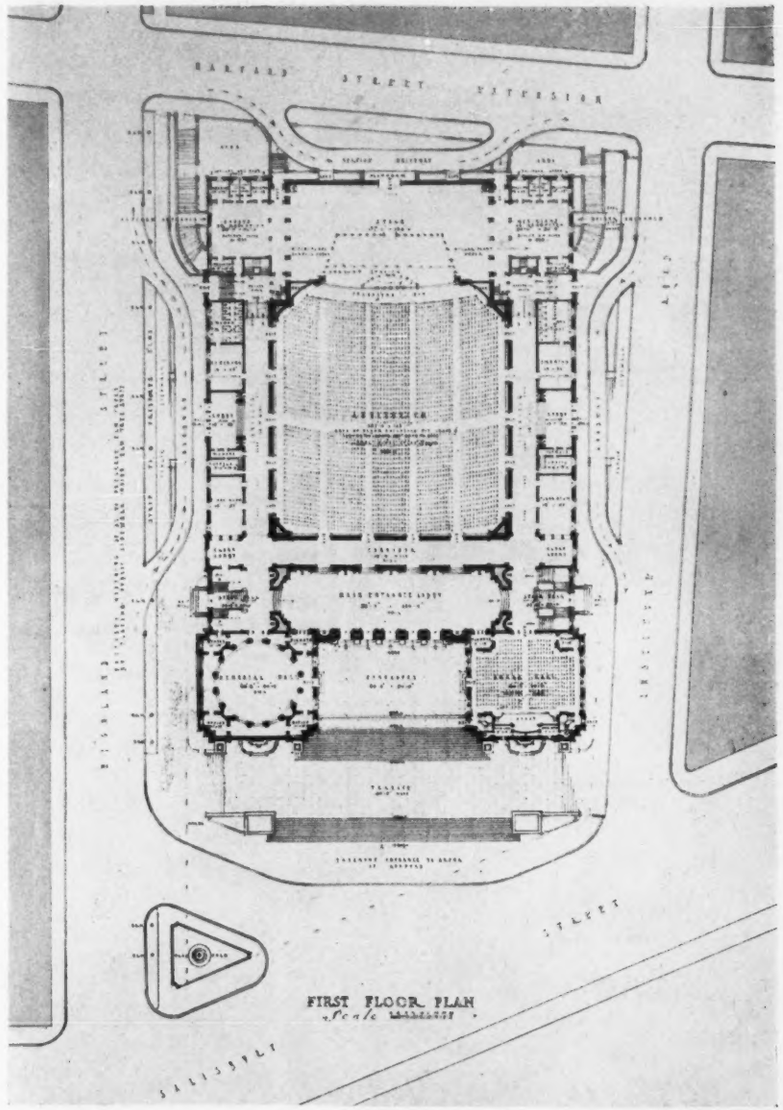


SECTIONS OF DESIGN PLACED THIRD, BY HENRY AND RICHMOND OF BOSTON

COMPETITION FOR WORCESTER MUNICIPAL MEMORIAL AUDITORIUM

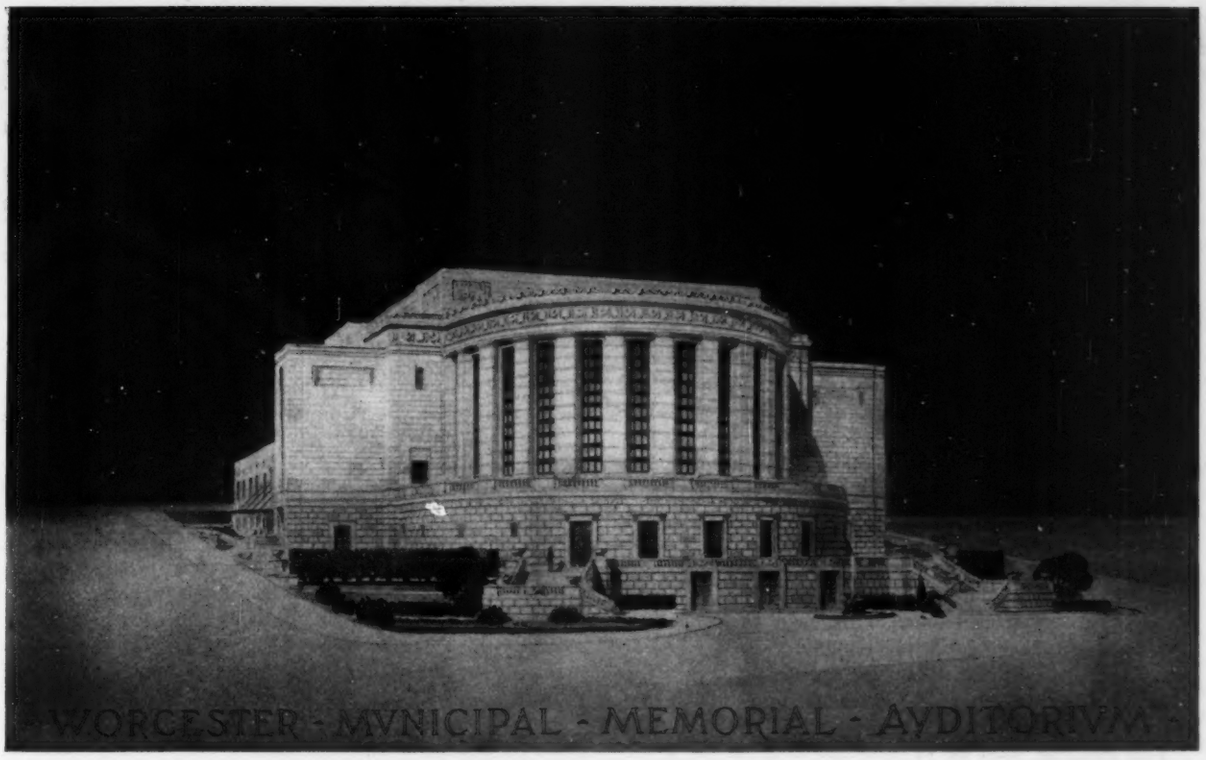


MAIN FLOOR PLAN OF DESIGN BY JASPER RUSTIGIAN AND WILL RICE AMON

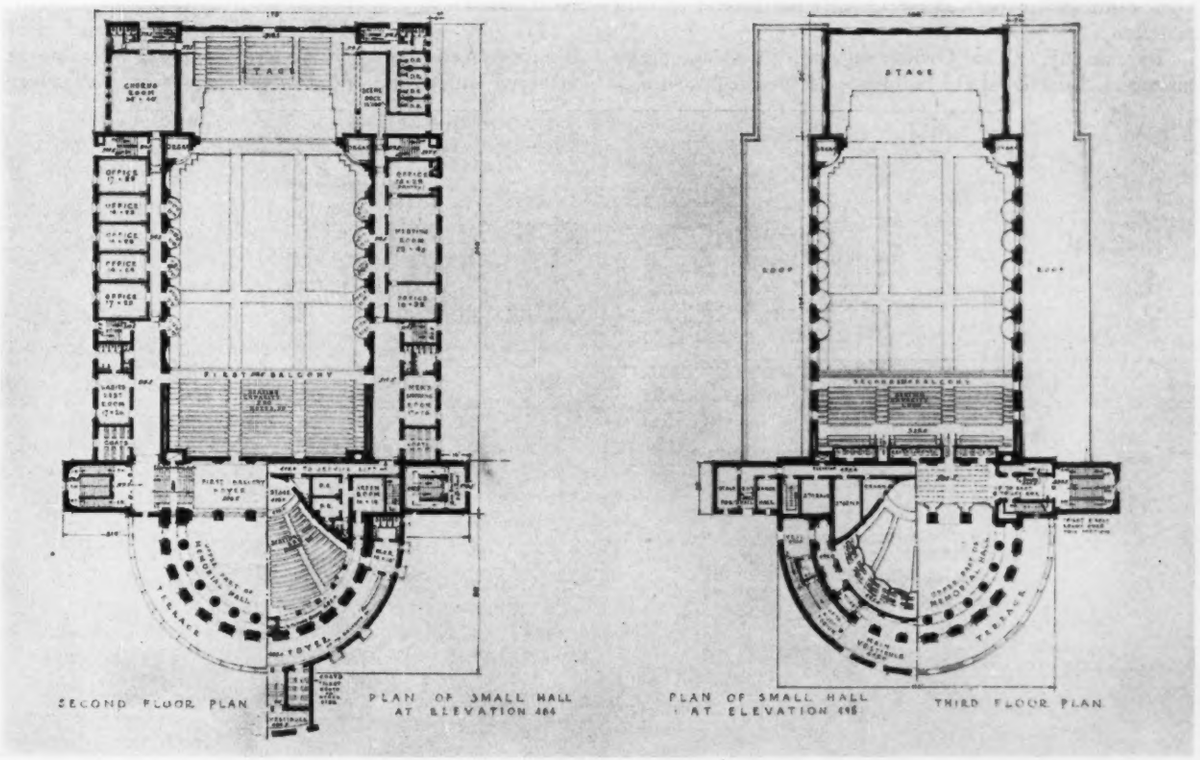


FIRST FLOOR PLAN OF DESIGN BY HENRY AND RICHMOND

COMPETITION FOR WORCESTER MUNICIPAL MEMORIAL AUDITORIUM



PERSPECTIVE OF DESIGN PLACED FOURTH, BY JASPER RUSTIGIAN ASSOCIATED WITH WILL RICE AMON



PLANS OF DESIGN PLACED FOURTH, BY JASPER RUSTIGIAN OF WORCESTER ASSOCIATED WITH WILL RICE AMON OF NEW YORK

COMPETITION FOR WORCESTER MUNICIPAL MEMORIAL AUDITORIUM

COMPETITION FOR THE WORCESTER MEMORIAL AUDITORIUM

(Continued from page 53)

A large stage 5'0" above auditorium floor is wanted, suitable for orchestral and choral concerts and dramatic performances.

The Owner would like the Auditorium, as the great central feature of the plan, to be a fine hall and of sufficient height to produce a noble proportion; a handsomely panelled and decorated ceiling and a modelled and decorated frame at the proscenium opening.

(b) The small hall shall seat approximately 700 persons on the floor and in one balcony.

A comparatively small stage only is wanted, as it will not be used for dramatic performances, but small anterooms must be provided. The floor of this hall may be built as a permanently sloping floor. This small hall should have suitable entrance lobby and vestibule, ticket office, stairs to balcony, proper emergency stairs and exits, cloak rooms, smoking room, toilet rooms, etc. Provide moving picture booth.

(c) The memorial hall or chamber is "to serve as a reverent and enduring tribute to the men and women of Worcester who have served the Republic in War."

It is the hope and belief of the Owner that externally, with the funds available, a handsome and monumental building can be obtained.

The building must be of first-class construction as defined in the Worcester building law or ordinances. (Mandatory.)

The exterior wall surface must be designed to indicate stone finish. (Mandatory.) The Owner hopes that this finish may be of granite, as the assumption of forty-eight cents (48c.) per cubic foot includes the cost of such material.

To sum up. The Owner suggests, in view of the memorial character of the building and the adequate funds at his disposal, that the competitors, while not neglecting or minimizing the utilitarian and practical necessities of the problem, will give paramount consideration to the study of beauty and æsthetics, to be in evidence on the exterior as well as in all the important public portions of the interior. To obtain a work of great architecture for the City of Worcester is the Owner's hope and ambition.

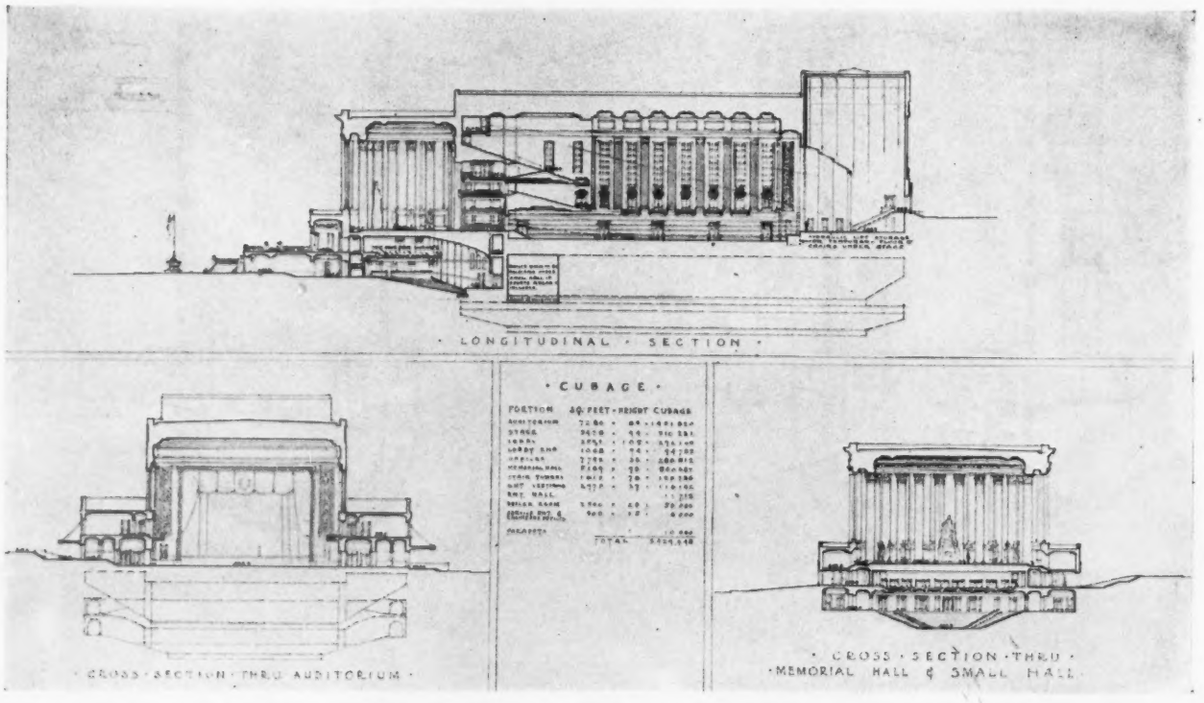
Report of the Jury of Award

In accordance with the instructions of the program we have strictly respected the anonymity of the competition and have refrained from any effort to identify the competitors. Eighteen designs were submitted for our consideration and these have been numbered by the Professional Advisor and the sealed envelopes containing the names of their authors have been deposited by him pending their opening by your Commission.

After prolonged study of these designs, the Jury has unanimously elected No. 13 [by Lucius Briggs associated with Frederic C. Hirons] as the most worthy and have voted therefore to recommend that its author be appointed as the architect of the new building. The considerations which have influenced this decision are as follows:

(1) The design has a plan of distinguished merit, of direct and logical circulation. A unique merit of this scheme which was not, however, suggested by the program is the extension of this circulation to the outdoors by means of free access to the side doors. Such a feature would lend itself interestingly in the summer to the purposes of pageantry and ceremonies. The Auditorium in its proportions and treatment is of excellent architecture. The relation to it of the Small Hall is admirable, admitting both of combined and independent use as occasion may require. The situation of the Memorial Hall is such as to affect felicitously the exterior as well as the interior of the scheme.

(2) The exterior of the building as illustrated is of distinctly monumental character, expressing clearly the memorial intention. *(Continued on page following)*



SECTIONS OF DESIGN PLACED FOURTH BY JASPER RUSTIGIAN ASSOCIATED WITH WILL RICE AMON

COMPETITION FOR WORCESTER MUNICIPAL MEMORIAL AUDITORIUM

(3) Beyond any designs submitted No. 13 takes account of the physical conditions of the neighborhood, particularly of the presence of the Boys' Club which, from many viewpoints in Lincoln Square, obscures a considerable portion of the Auditorium site. The Jury, it should be stated, was much impressed by the importance of this consideration in determining the availability of a competitive scheme. In the design presented the architectural interest of the façade is confined to such limit of width as to be independent of this intrusion. The plan, moreover, is skillfully contrived to make for attractive appearance to the approach from the north and south.

The Jury has elected No. 6 [J. D. Leland Company] as entitled to the second prize. This design, though distinctly less adapted to its situation and less monumental in expression, has an exterior of notable refinement and the plan admirable simplicity and directness.

It is recommended that the third prize be awarded to No. 5 [by Henry and Richmond]. Here, as in the case of several designs submitted, the Small Hall and the Memorial Chamber have been, not without obvious difficulty, symmetrically opposed in the plan. The author has made very attractive and picturesque use of the arrangement, however, in the development of an otherwise admirable and straightforward scheme.

No. 15 [by Jasper Rustigian associated with Will Rice Amon] has been appointed as the fourth prize. This shows an auditorium of excellent proportions and a well studied arrangement, even if the interesting façade has been achieved at some sacrifice to other interests of the plan as well as to the exterior.

The Jury ventures to suggest to the Commission that so important a condition to the dignified architecture of this neighborhood as the construction of this Auditorium would seem to demand a study of the lines of Lincoln Square which at present is so formless and unattractive. It is also impressed by the necessity of reconsidering the situation of the proposed War Monument with the view of bringing it into a responsible and symbolic relation to the new Auditorium.

Jury of Award
- Charles D. Maginnis
- F. Ellis Jackson
- J. Frederick Larson
- George F. Booth
- George N. Jeppson

HEIGHTS OF NEW YORK SKYSCRAPERS

Interest in the heights of New York skyscrapers does not seem to abate, if we may judge by the inquiries concerning them received in this office. For the benefit of those who are interested, therefore, we are printing the following list, compiled and published several months ago by *The New York Sun*.

It should be noted that the heights given include such superstructures as the dirigible mast on top of the Empire State Building or the steel spike which surmounts the Chrysler Building. We will be glad to have any inaccuracies called to our attention. The list follows:

	Stories	Feet
Empire State Building	85	1,256
Chrysler Building	77	1,050
City Bank-Farmers' Trust	71	935
Manhattan Co. Building	70	927
Woolworth Building	60	792
Metropolitan Life	50	700
Salmon-Bristol Building	58	698
Chanin Building	56	680
Lincoln Building	53	678
1 Wall Street	50	638
10 East Fortieth	44	635
New York Life	35	617
Singer Building	45	612
New Waldorf Astoria	40	600
Ritz Tower	42	592
Municipal Building	33	580
Sherry Netherland	38	570
New York Central	39	567
Navarre Mercantile	44	565
Equitable Trust Co.	42	550
Park Central Hotel	31	550
Equitable Building	42	542
Bankers Trust Co.	39	540
Downtown Athletic Club	31	535
Julius Nelson Project	45	525
Transportation Building	42	520
Bank of N. Y. & Trust	30	513
Hotel Pierre	41	503
Chase National Bank	38	496
Lefcourt National	40	490
Benenson Building	33	487
New York Telephone	31	486
New Fuller Building	40	480
Battery Tower	40	462
International T. & T.	35	455
Lefcourt Colonial	40	454
Harriman Building	38	452
Louis Adler Building	32	450
Hotel New Yorker	40	443
Brown Bros.	35	440
The News Building	36	439
Bank of U. S.	36	432
Empire Trust Building	33	430
National City Co.	33	430
120 Wall Street	33	430
Bush Terminal Building	30	430
Fred F. French Building	38	428
Fifty Broadway	35	428
Barbizon Plaza	40	425
Caryle Hotel	40	425
Adams Express	32	424
Savoy Plaza	33	420
New Squibb Building	34	419
American Express	32	415
Hotel Shelton	34	412
Whitehall Building	32	408
Gresham-Rector St. Building	35	400
New San Remo	30	400
Graybar Building	30	400
St. Moritz Hotel	36	395
New 29 Broadway	32	393
Bricken Textile	33	387
Sinclair Oil Building	33	385
Hotel Delmonico	32	380
Morris-West St. Building	31	375
Salmon Tower	33	374
Tudor City Woodstock Tower	32	355
Hotel Beverly	30	356
Hotel Governor Clinton	31	347

THE JAMES HARRISON STEEDMAN MEMORIAL FELLOWSHIP IN ARCHITECTURE

THE GOVERNING COMMITTEE of the James Harrison Steedman Memorial Fellowship in Architecture announces the sixth competition for this Fellowship, to be held in the spring of the year 1931.

This Fellowship is founded in memory of James Harrison Steedman, M.E., Washington University—1889, First Lieutenant U. S. Naval Reserves, Assistant Engineer Officer U. S. S. Oklahoma in 1917 and 1918, who at the age of fifty, suffering from a malady curable only by rest, refused to quit his post and knowingly made the great sacrifice.

The value of this Fellowship is represented by an annual award of Fifteen Hundred Dollars, to assist well qualified architectural graduates to benefit by a year in travel and the study of architecture in foreign countries, as determined by the Committee and under the guidance and control of the School of Architecture of Washington University.

This Fellowship is open on equal terms to all graduates in architecture of recognized architectural schools of the United States. Such candidates must be American citizens of good moral character, and shall have had at least one year of practical work in the office of an architect practicing in St. Louis, Mo., before being entitled to assume the benefits of the Fellowship. All candidates shall be between twenty-one and thirty-one years of age at the time of appointment to this Fellowship.

Application blanks for registration can be obtained at any time upon written request addressed to the head of the School of Architecture of Washington University, St. Louis, Mo., to whom application blanks properly filled out must be returned not later than January 24, 1931. Any requests for supplementary information relative to the rules and regulations governing the Competition shall be made at the same time.

Any candidate who holds a degree not conferred by Washington University must submit with his application a transcript of the record of his scholastic work.

Each application must bear the endorsement of three members of the American Institute of Architects, one of whom at least must be a resident of the City of St. Louis.

BROOKLYN CHAPTER, A.I.A.

THE BROOKLYN CHAPTER of the American Institute of Architects at the November monthly dinner appropriated $100 to aid the unemployed draftsmen through the Architects' Emergency Committee.

Many members told of an unusual number of unemployed at this time and recommended not only that public works be speeded up by the State and City, but that where possible owners should pay particular attention to the improvement of their property during this period of low costs.

Twelve applications were received for consideration in the membership drive to include especially those in the outlying districts of Long Island.

William P. Bannister, Chairman of Legislative Committee, briefly outlined the work of his committee at the coming session of the legislature and the serious problem for architects in the necessity of combating unfriendly legislation.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION ANNOUNCES COMPETITION

PRIZES AGGREGATING $1,700.00 are being offered by the American Institute of Steel Construction, 200 Madison Avenue, New York, for the best design for a steel bridge.

There will be two competitions, each having a first prize of $500.00, a second of $250.00, and a third of $100.00, one going to engineering students and the other to architectural students. The first will be judged by a national jury of engineers and architects and is open to any engineering student attending a school or college in the United States or Canada. The second will be held through the Beaux-Arts Institute of Design.

The problem is a monumental bridge of restrained simplicity, such as would be erected over a navigable river within the corporate limits of a city of approximately 150,000 inhabitants. It would be 80 feet wide including two sidewalks of 10 feet each, and a total length of 1,770 feet. The approaches for a distance of 165 feet would represent retaining walls and abutments. Night illumination would be provided for.

This is the third annual student competition held by the American Institute of Steel Construction. Previous competitions of like nature have enlisted the interest of hundreds of students and have developed many bridge designs of considerable æsthetic appeal.

THE JAMES TEMPLETON KELLEY FELLOWSHIP IN ARCHITECTURE

THE FELLOWSHIP, with an income of $2,500 for one full year, was established in 1929 by Mrs. James Templeton Kelley in memory of her husband. The fellowship is administered by the Boston Society of Architects (a Chapter of the American Institute of Architects) and is to be assigned to an individual of proved ability, whether a student, an instructor, a draftsman, or a practicing architect, for foreign travel for the pursuit of advanced studies in architecture. It is open to any man or woman residing within the area under the jurisdiction of the Boston Society of Architects (Maine, New Hampshire, Vermont and Massachusetts), preferably a citizen of the United States of America, and is to be awarded annually on the basis of evidence submitted by the applicant, and otherwise secured by the Committee on Education of the Boston Society of Architects. The Executive Committee of the Boston Society of Architects makes the award on the recommendation of the Committee on Education of the Society. The holder is eligible for re-appointment. If, in any year, no suitable candidate appears, the sum available is to be set aside as a separate fund which may be used to defray expenses incurred in publishing the results of the work produced by any of the James Templeton Kelley Fellows, or for other purposes connected with the Fellowship. In any year, the Committee may reserve a part of the income, not exceeding $500, to defray expenses incurred in the administration of the Fellowship.

Applications for the year 1931 should be in the hands of Niels H. Larsen, Secretary of the Committee on Education of the Boston Society of Architects, 814 Statler Building, Boston, on or before January 19, 1931, and should state the applicant's age, education, experience, present occupation, and suggestions for his work abroad.

This department conducts four competitions each month. A prize of $10.00 is awarded in each class as follows: Class 1, sketches or drawings in any medium; Class 2, poetry; Class 3, cartoons; Class 4, miscellaneous items not coming under the above headings. Everyone is eligible to enter material in any of these four divisions. Good Wrinkle Section: a prize of $10.00 is awarded for any suggestion as to how work in the drafting room may be facilitated. No matter how simple the scheme, if you have found it of help in making your work easier, send it in. Competitions close the fifteenth of each month so that contributions for a forthcoming issue must be received by the twelfth of the month preceding the publication date in order to be eligible for that month's competitions. Material received after the closing date is entered in the following month's competition.
The publishers reserve the right to publish any of the material, other than the prize winners, at any time, unless specifically requested not to do so by the contributor.

THE PRIZES this month have been awarded as follows:

Class I—Allyn Gordon, Corsicana, Texas.
Class II—John M. Kerr, Buffalo, N. Y.
Class III—Byron E. Laidlaw, Crestwood, N. Y.
Class IV—Thomas Pao Ho Liang, Tientsin, China.
Good Wrinkle—J. Carroll Tobias, Bethlehem, Pa.

Christmas cards are starting to come in for our competition but inasmuch as we are going to press early this month we have decided to advance the closing date until January 10th to give even the most belated entries a chance. So if you haven't already sent in your greeting card do it now!

Please be sure to let us know what you think of the first of our new series of cartoons printed on page 67. We're going to publish one of these each month during 1931!

KOH-I-NOOR PENCIL FOUND WITH ANDRÉE'S DIARY

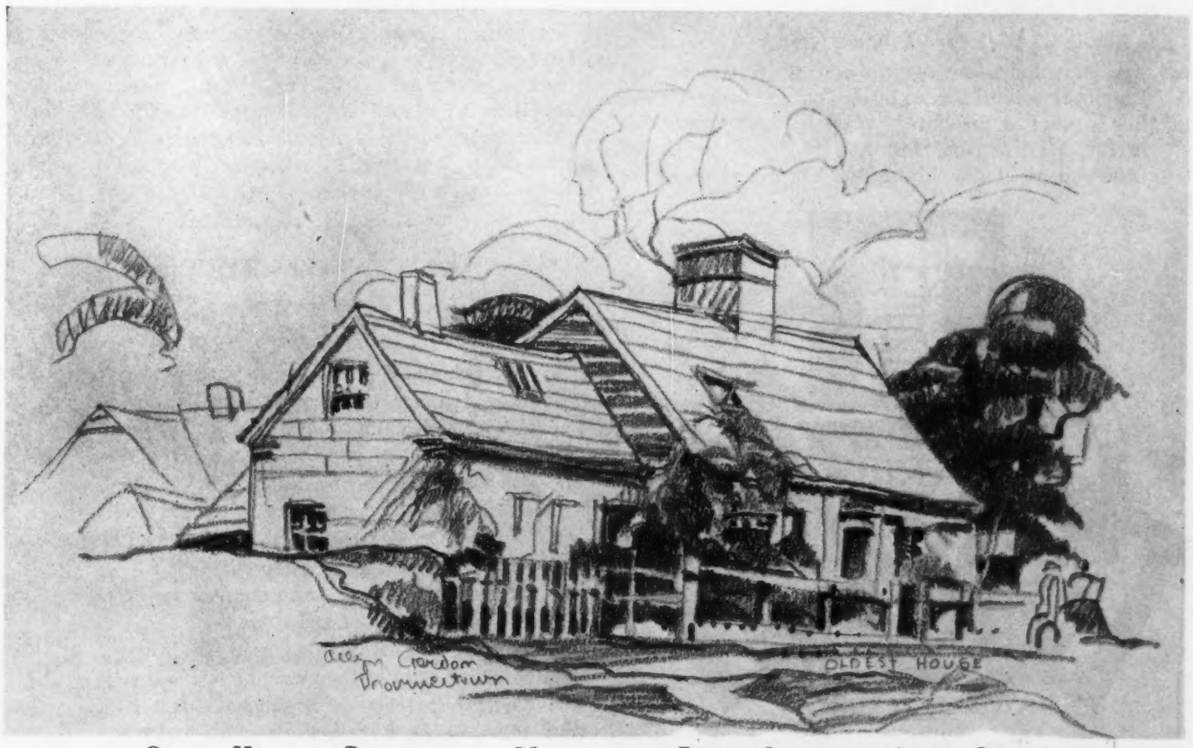
IT WILL PROBABLY be of some interest to architectural draftsmen to know that the lead pencil found with the diary of Andrée, the Arctic explorer, whose body was recently discovered in the polar regions after thirty-three years, was a Koh-I-Noor. The report did not state whether or not the pencil was a 2B or softer, so it is not known whether the fact has any arctictectural significance or not.

AN ODE TO PENCIL POINTS HORIZONTALLY AND VERTICALLY

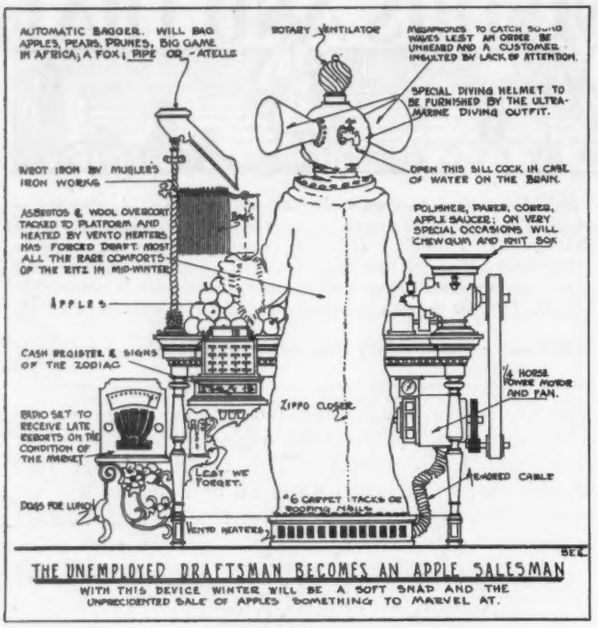
By Thomas Pao Ho Liang of Tientsin, China

*P*ushing a pencil without cease;
*E*ating Sandwiches minus peace.
*N*othing must stop him while he draws—
*C*arefully not to cause some flaws.
I think there's nothing worse in Life
*L*ike an architect with his strife.

PENCIL POINTS his only pleasure,
*O*ne great joy that's without measure.
*I*t's a welcome ray of sunshine,
N the South Seas with her moonshine.
*T*o YOU he looks when he is sad—
*S*ure! Only YOU can make him glad!



OLDEST HOUSE IN PROVINCETOWN, MASS., FROM A PENCIL SKETCH BY ALLYN GORDON
(PRIZE—*Class One—December Competition*)


AUTOMATIC BAGGER. WILL BAG APPLES, PEARS, PRUNES, BIG GAME IN AFRICA, A FOX, PIPE OR ATELLE
ROTARY VENTILATOR
MEGAPHONES TO CATCH SOUND WAVES LEST AN ORDER BE UNHEARD AND A CUSTOMER INSULTED BY LACK OF ATTENTION.
SPECIAL DIVING HELMET TO BE FURNISHED BY THE ULTRA-MARINE DIVING OUTFIT.
OPEN THIS SILL COCK IN CASE OF WATER ON THE BRAIN.
WROT IRON BY MUELLER'S IRON WORKS
ASBESTOS & WOOL OVERCOAT TACKED TO PLATFORM AND HEATED BY VENTO HEATERS HAS FORCED DRAFT. MOST ALL THE RARE COMFORTS OF THE RITZ IN MID-WINTER
POLISHER, PARER, CORER, APPLE SAUCER; ON VERY SPECIAL OCCASIONS WILL CHEWGUM AND KNIT SOX
APPLES
CASH REGISTER & SIGNS OF THE ZODIAC
¼ HORSE POWER MOTOR AND FAN.
RADIO SET TO RECEIVE LATE REPORTS ON THE CONDITION OF THE MARKET
ZIPPO CLOSER
LEST WE FORGET.
ARMORED CABLE
DOGS FOR LUNCH
#6 CARPET TACKS OR SCOOPING CHISELS
VENTO HEATERS
THE UNEMPLOYED DRAFTSMAN BECOMES AN APPLE SALESMAN
WITH THIS DEVICE WINTER WILL BE A SOFT SNAP AND THE UNPRECIDENTED SALE OF APPLES SOMETHING TO MARVEL AT.

By Byron E. Laidlaw

(Prize—*Class Three—December Competition*)

A TOY FOR TIRED ARCHITECTS AND DRAFTSMEN

Designed by Thomas Pao Ho Liang of Tientsin, China

(Prize—*Class Four—December Competition*)

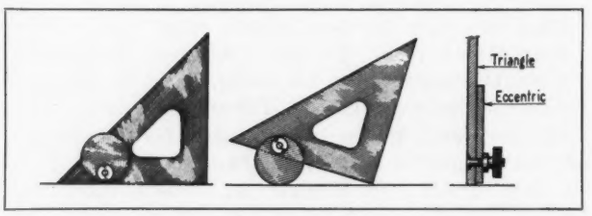
Either of the following two directions should be closely followed in order to obtain the best result:

A. Cut out the design below carefully, closely following the outline, and carry it in your pocketbook when it is full of dough and lose it when convenient. There should be no trouble whatever in case you happen to reside in a place called Chicago.

B. Tear this design out roughly and bring same to your Employer when he is at his busiest and request from him a piece of cardboard. Tell him what you want it for. Then from his desk pick up the jar of paste and use it liberally to stick the design on to the piece of cardboard. Be sure to leave sticky finger-prints all over his desk. You will then hunt for the scissors, upsetting the bottle of ink in the meantime. When at last you find them you will closely follow the outline with careful manipulation of the instrument. Better take your time in cutting—take an hour, if possible—as your Boss will like you so much more when he sees you working with such earnestness and cheek. More than certain he will raise your present salary, provided it is nothing. When completed, insert his tie-pin in center and spin it before his eyes, spelling death. You'll be surprised at the result! But no matter what may happen be nonchalant and light one of his favorite cigars as you make your exit on a stretcher.

A Toy for Tired Architects and Draftsmen

(See text above)



A SIMPLE ADJUSTABLE TRIANGLE

By J. Carroll Tobias

(Prize—*Good Wrinkle—December Competition*)

Any ordinary forty-five- or sixty-degree triangle can be very easily made adjustable to various angles by the simple addition of an eccentric as shown in the illustration. The eccentric may be made of celluloid, hard rubber, bakelite, wood, or any similar material, and is held to the triangle by a small screw and knurled nut. This construction is shown in the cross-section. The screw should be one with a flat head that can be filled flush with the back of the triangle. About a 6-32 screw is quite large enough, and a knurled nut can be secured at the radio counter of any "Five and Dime" store. When the eccentric is not in use it can be swung up out of the way or removed entirely. Calibration marks may be cut into the eccentric to indicate definite angles, in this way further increasing its usefulness. Such a device is of great value when drawing screw threads, section-lining at odd angles, and work of like nature.

'TWAS EVER THUS

By John M. Kerr

(Prize—*Class Two—December Competition*)

'Twas the opening night of "Community Hall,"
A building designed to accommodate all,
The Council's debatings—the Firemen's wagon,
An up-to-date Cooler, and, honest, no braggin'
The plan was a dandy—the fixings just swell,
Complete from the Corner Stone up to the Bell.
'Twas a sight for sore eyes as his worship the Mayor
Began to orate to the gang gathered there.
The Hall sure was packed from the floor to the rafters,
Good honest faces before and abaft us.
Country lads, each clinging tight to his "Mabel"
Waiting as patiently as they were able,
For, after the speeches the dancing was free
With the I. O. D. E. dishin' ice cream and tea,
College boys steppin' with cute little nifties,
Aldermen pompous, well up in the fifties.

ENTHUSIASTIC ARCHITECT: "You See, This Spike Runs Down the Entire Length of the Building and If Anyone Builds a Taller Building We Can Jack Up the Spike and Still Be the Tallest!"

Tough lookin' bozos and gay racketeers,
Limousine ladies decked out to the ears.
Attar of Roses and perfumes exquisite,
Mingled with garlic and other "What is it?"
Bankers and Brokers were sniffin' the air,
Bless me! if all the darn town wasn't there
With the single intention and object in view,
To cast the old optic on somethin' that's new.

The Mayor started in to congratulate all
The diff'rent contractors who'd worked on the Hall—
For they'd followed the plans with meticulous care,
To erect this great building—this monument fair.
He praised the foundations—the columns of steel;
The Façade he described as being almost unreal
In its beauty, and symmetry—Columns so white—
Ghostly, like schooners that pass in the night.

The Masons were fêted as Wizards of Oz—
The Plumbers were *Plumbers*—How Come? Why, because
For once pipes were laid with a speedy precision,
And laid where they ought to be laid, in addition.
The Walls were so white, and so beautiful too,
They took off their hats to the Plasterers—Whew!
Carpenter, Painter, each hard-boiled mechanic
Blushed rosy red in embarrassing panic.
What a gay saturnalia of brotherly love;
On everyone's shoulder there rested a dove.
The Building was open—all cares were forgotten,
But, to me, in all Denmark, just one thing was rotten.
For, "Who is that meek little man over there,
Whose brow is all furrowed and wrinkled with care?"
You've guessed it no doubt, or been led to suspect
He's the *poor* insignificant Architect!
Did the audience rise, and stand at attention?
Why, he didn't get even DISHON'RABLE MENTION!

PRATT ARCHITECTURAL CLUB

THE ANNUAL FALL DINNER of the Club was held on November 19, 1930, at the Fraternity Club and proved to be a splendid success. More than eighty members and friends gathered around the festive board, some coming a considerable distance from up-state and neighboring states.

In view of present economic conditions it was felt that the attendance was very gratifying.

Following the dinner a number of speakers were heard from, including Donald Fletcher, Instructor in Senior Design at Pratt; J. Floyd Yewell, widely known artist and delineator; and Ralph Walker, of the firm of Voorhees, Gmelin, and Walker, who told of the plans under way for the Chicago World's Fair in 1933, and of the work being done by the group of architects associated on this great project.

Our only regret was that Mr. Walker could not talk at even greater length on this fascinating subject.

Plans are in full swing for the Second Annual Dance to be held at the Architectural League, New York, on Saturday, January 24th. Those who attended last year's affair were unanimous in requesting that another affair be held by the Club, and at the same place. One of the best orchestras has been secured and the Committee is preparing for a large crowd. All Pratt men and their friends will be welcome.

DETAILS OF CONSTRUCTION

THE TWO PLATES of detail sheets, in this issue, were drawn up by Philip G. Knobloch from information supplied by Sexauer & Lemke of Long Island City, New York, and the McGregor Architectural Iron Works of Scranton, Pa.

AN ACKNOWLEDGMENT

THE DESIGN for a Christmas card by Albert R. Caulstone, published on page 1001 of our December issue, was copied from a greeting card by Paul H. Harbach, published in PENCIL POINTS two years ago.

ARCHITECTS' LEAGUE OF HOLLYWOOD

AT A RECENT meeting of the Architects' League of Hollywood, L. G. Scherer was elected President; Verner B. McClurg, Vice-President; and J. A. Murrey, Secretary-Treasurer.

The League contemplates a year of very active endeavor. The principal tasks which it has outlined for itself are:

1st: The education of the layman to a keener appreciation of the economical and æsthetic importance of architecture.

2nd: The initiating of a definite program to bring about a new and more economical plan of financing building operations.

PENCIL POINTS COMPETITION DRAWINGS ON EXHIBITION

A SELECTED GROUP of designs for An Eight-room House and Two-car Garage submitted in the PENCIL POINTS' Competition is now being shown at the Boston Architectural Club. The latter part of this month they will be on exhibition at the Massachusetts Institute of Technology, Rogers Building, Boston. In early February the drawings will be on view at the Cambridge School of Landscape Architecture and on February 15th the Architectural League of New York will show them.

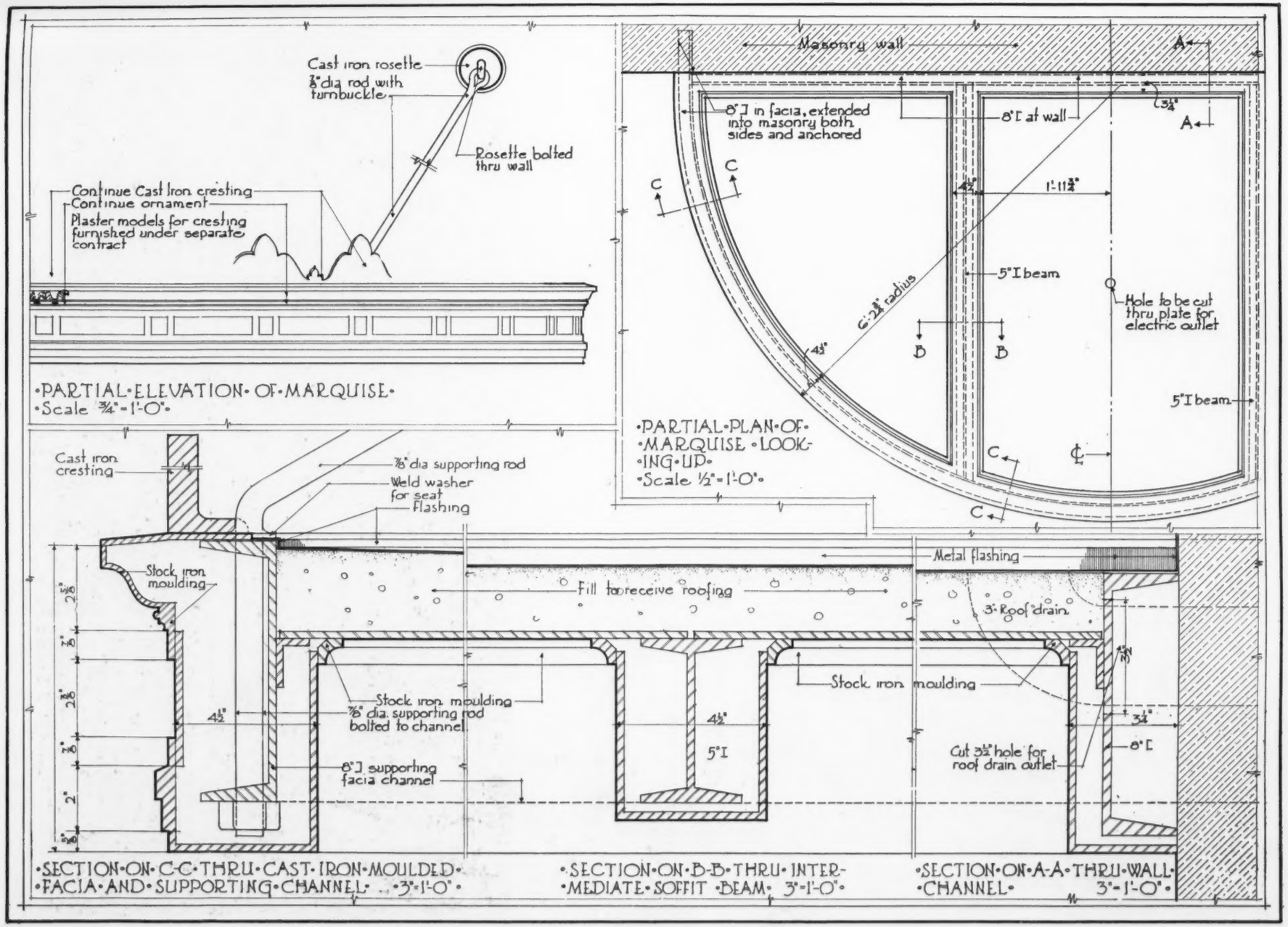
CONCERNING THE REGISTRATION LAW

SEVERAL MONTHS AGO we received a letter from two subscribers drawing to our attention a certain abuse of the New York Registration Law whereby a certain gentleman, although not a competent architect, was permitted to file plans. We have brought this matter to the attention of the proper authorities, who will undoubtedly take steps to investigate and correct the illegal action.

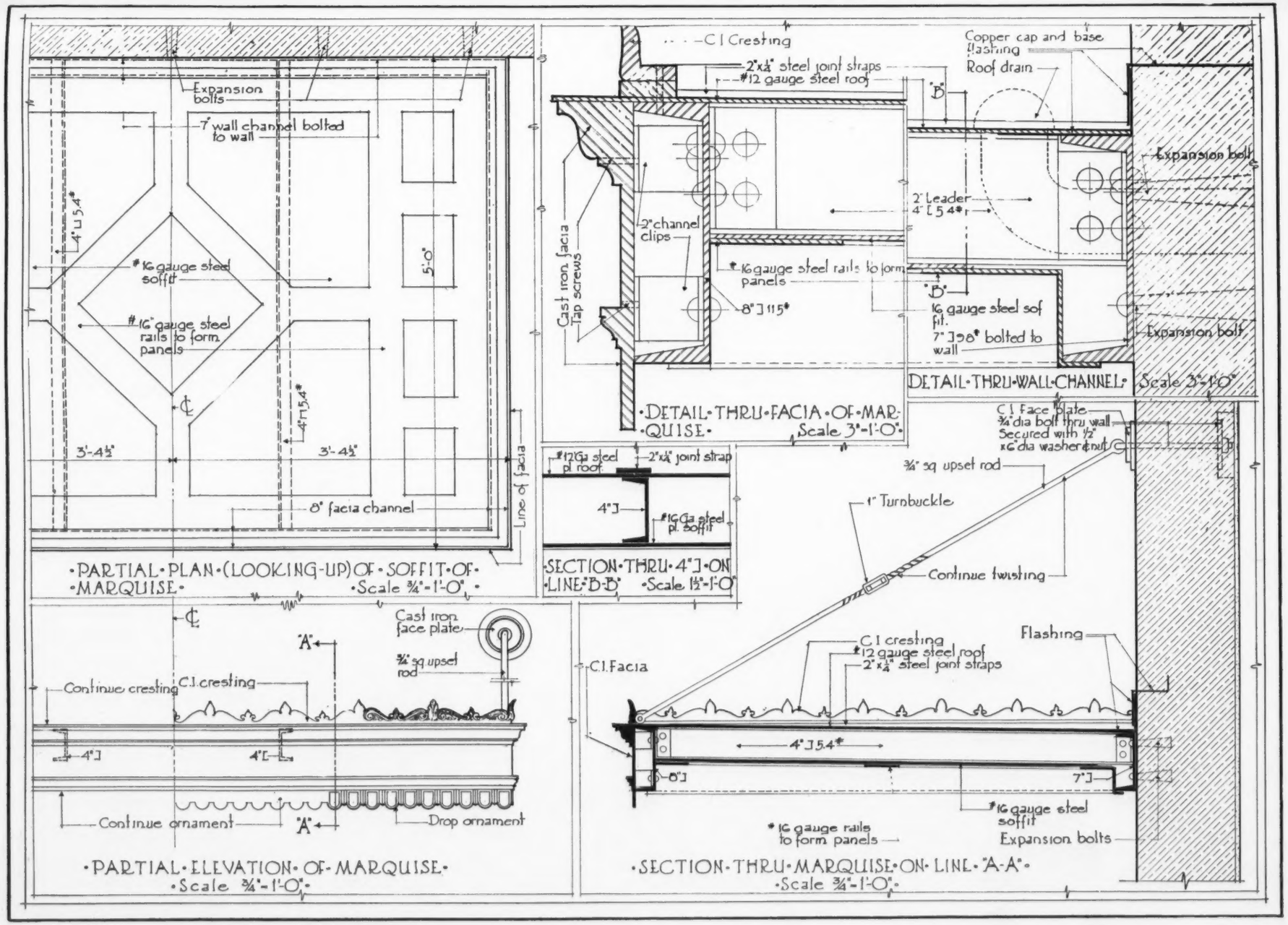
A CORRECTION

CHARLES H. HOLMSTROM, whose design for a small house was published on page 897 of the November issue, lives at 4271 Aloha Place, San Diego, California, not in State College, Pennsylvania, as erroneously printed.

WINNING DESIGN IN A COMPETITION FOR "THE SOLDIER'S MEDAL," GAETANO CECERE, SCULPTOR



DETAILS OF CONSTRUCTION FOR A MARQUISE—DRAWN BY PHILIP G. KNOBLOCH



DETAILS OF CONSTRUCTION FOR A MARQUISE—DRAWN BY PHILIP G. KNOBLOCH

THE SPECIFICATION DESK

Whys and Wherefores of the Specification

4—Masonry

By Philip G. Knobloch

Under the heading of Masonry we include all masonry work (such as face and common brick, back-up wall tile, block partitions of hollow tile, gypsum or concrete, and other similar materials. These materials are furnished and erected under this contract.

Often stone and terra cotta are also included under this heading, but, unless the amount used on the building is small, it should be handled under separate headings. By a small amount of stone or terra cotta we mean an entrance or possibly the cornice of the proposed building. The building upon which this specification is based is entirely faced with granite ashlar and cut stone and is specified separately.

The first part of the Masonry Specifications, headed "Masonry Materials," covers the materials alone, describing just what is wanted as to grade, type, and so on. The second part of the Masonry Specifications, headed "Masonry Work," explains the method of procedure and actual installations.

MASONRY MATERIALS

General Conditions

General Conditions of the Contract of the American Institute of Architects, current edition, shall form a part of this Division, together with Special Conditions to which this Contractor is referred.

Scope

The following requirements in regard to materials shall govern in all cases where such materials are used on any part of the work where in conflict with local Building Regulations. When local Building Requirements are in excess of the requirements herein specified, they shall be followed.

Before approving the use of any material or product the Architect may, at his discretion, require the Contractor to furnish conclusive evidence that the materials or products proposed for use on the work conform to the requirements herein specified.

The work under this Contract shall include all labor and materials for the furnishing, delivery, and setting of all mason work in accordance with the drawings Nos. 1 to 8 and 200 to 202 inclusive and as hereinafter specified.

Water

Water used for concrete, mortar, and grout shall be clean and free from organic materials, strong acids or alkalis, or water used by city, town, or village for drinking purposes.

Sand

Sand for setting Brickwork, Rough Stone Masonry, Hollow Tile work shall be clean, coarse, and sharp, free from salt, loam, clay and other foreign materials. If necessary to obtain this condition, washing will be required.

Sand for setting Granite, Cut Stone, shall be sharp, clean washed stone.

Samples of sand proposed for the use shall be submitted to the Architect for approval. Where doubt exists as to the suitability of the sand or where so specified it shall be analyzed and tested by a competent testing laboratory, at the expense of the Contractor submitting same.

There is one noticeable difference in the sand required under the Masonry Specifications and that specified under Concrete. Both sands must be clean, coarse and sharp and free from salt, loam, clay, etc., but sand for the masonry work need not be graded in size. Grading was very important when the sand was used for concrete work as was explained under that heading. An even grade is preferable for cement mortar. Large pebbles in the sand would make it difficult for the mason to spread the mortar evenly, especially if the mortar joints were narrow.

Cements

Portland Cement shall be a standard brand, approved by the Architect, conforming to the standard specifications, current edition, of the American Society for Testing Materials.

Nonstaining Cement shall be a first grade product subject to the Architect's approval.

Mortar

a. Cement Mortar.

Shall consist of Portland Cement and sand in the proportion of one (1) part of cement to three (3) parts of sand, tempered with not more than one (1) part of hydrated lime to ten (10) parts of cement.

b. Nonstaining Mortar.

Nonstaining Mortar shall consist of one part nonstaining cement and not more than three parts of suitable inert materials, all of which are subject to the approval of Architect, Engineer.

c. Lime Mortar.

Lime Mortar shall be composed of one part lime putty or hydrated lime and not more than three parts of sand.

d. Brick Masons Cement Mortar.

Brick Masons (Special) Cement Mortar shall be . . . . . Company's manufacture and shall be delivered in unbroken packages with the maker's name and brand indicated thereon.

e. Cement Lime Mortar.

Cement Lime Mortar shall be composed of one part cement, one part lime putty or hydrated lime, and not more than six parts sand.

f. Waterproofed Mortar.

Integral waterproofing shall be used in mortar as required by the Architect. It shall be a variety approved by the Architect, Engineer, and shall be used in a manner satisfactory to him and according to the specifications of the manufacturer.

METHOD OF MIXING

All mortar used for laying brick shall be thoroughly mixed either by hand or in a mechanical batch mixer. The use of a continuous mortar mixer is positively prohibited.

AMOUNT OF WATER

A minimum amount of water, only sufficient to make a workable mortar, shall be used.

The mixing of mortar is important. Again we want the cement, sand, and lime thoroughly mixed so that we will derive the full benefit of its strength and denseness. Only by thorough mixing will we achieve this result. The matter of the correct amount of water, while very vital in all matters pertaining to mortar or concrete mixing, will, in most cases, take care of itself in the case of masonry mortar. There is little danger in getting a too wet mortar. With a too wet mortar the brick mason finds it well nigh impossible to lay an even bed of mortar for the brick. In addition, when the brick is laid on this mortar, the weight of the brick will cause it to settle unevenly in the soft mortar, making it difficult and ofttimes impossible to keep any sort of alignment. The brick mason will immediately complain and in short order a stiffer mix will be forthcoming, not only because of the mason's complaint but because the contractor knows that it takes a much longer time to lay brickwork under such conditions and the labor cost is important to him. This is also true if the mortar contains large pebbles or stones. Again, the mason will voice his complaint.

The use of a continuous mixer is prohibited. It is desirable that each batch of mortar be exhausted before a new batch is made. With the continuous mixer it is impossible to keep a check on what has been mixing and what has been added and it is easily possible to have a portion of mortar in the mixer for too great a length of time before it finally is used. This time may be well beyond the initial set and therefore dangerous to use.

SLAKING LIME

All lump lime used shall be thoroughly slaked and shall not be mixed into mortar until it has stood for at least 48 hours after the initial slaking process has been completed.

RETEMPERING

The use of retempered mortar of any kind, which has taken any degree of initial set, is prohibited.

Retempering mortar which has taken its initial set as retempering concrete and the reasons for prohibiting the practice of using retempered mortar is the same. Any mortar or concrete having had its initial set cannot be used with the full guarantee that it will develop its full strength. And as we are always striving for the best masonry it would be silly and childish for the sake of a little mortar to jeopardize in any way the result of our completed work.

MORTAR COLORS

Mortar colors shall be mineral colors only and shall be of a character which will not weaken the strength of the mortar joint. They shall be used in strict accordance with the manufacturer's directions and in such proportions as will produce a mortar color satisfactory to the Architect, Engineer.

In this paragraph you will note we mention mineral colors only. Their specific use is specified because they will be practically permanent as to color and will not be injurious to the mortar.

BRICK

All Clay or Shale brick for common brickwork shall conform to the current edition of Standard Specifications for Building Brick of the American Society for Testing Materials.

The question of specifying common brick or in fact any brick is governed in at least two ways: first, the type brick required for the building and, second, the possibility of local or near local manufacture. In normal building periods added freight costs often limit the selection of brick. In Architecture we do not regard cost as important but in Business we cannot do otherwise but think in terms of cost. In this we are usually assisted by the Owner or Building Committee whose thoughts are ever along the lines of total cost.

The selection of the brick, however, having been determined by the Architect as suitable to his building, is better specified by number and name of manufacturer. This is the safest and best method. It means you will get what you know is suitable for your design and will definitely free you of an army of brick salesmen trying to sell you every type of brick you do not want. Therefore the specification on the brick should read as follows:

FACE BRICK

Face brick to be of following shades . . . . . , as manufactured by the . . . . . Brick Company. (Samples are in Architect's office.)

NOTE: *All exterior brickwork shall be face brick as indicated on drawings. The interior of fire-tower shall be face brick.*

Be sure either to explain clearly where the face brick is to be used, or indicate it with sufficient notations on the drawings so that there is no question in the mind of the contractor.

This should apply also to common brick. The quality of the brick such as soundness, hardness, and burning, are covered under the previous heading of "Brick," where we quote the American Society for Testing Materials. Either the hard or medium grades are used. The vitrified applies to paving brick and the soft brick we do not permit on our work.

A brick, in general, should be regular in shape and size and free from any deep kiln marks. It should be well burned, firm and hard in texture and free from air pockets and fissures. A common method used in testing the soundness of brick is to strike two bricks together or use a hammer. If the result is a clear metallic ringing the brick is generally sound and well burned. A dead sort of ring or thud indicates a brick of questionable value.

Brick sizes will vary in different plants but in most cases not enough to cause any inconvenience. There are, though, some brick plants whose manufacturing methods are bad and variations of 3/8 of an inch are common. Variations so great will cause havoc in pattern work. It is well for the Architect to consider this condition before selecting a face brick for the building where much pattern work is intended. The standard size as agreed upon by the American Face Brick Association is a brick 2¼" thick, 3¾" wide and 8" long. Variations from 1/16" to ⅛" are not serious but greater variations are bad for face work. Of course, in backing up we are not concerned a great deal about size.

In common we have the clay and the shale brick made from the materials from which they receive their name. The color varies as to locality. Throughout the East our

common bricks are usually red while in the West they are usually yellow. In both cases the varying grades of hardness occur according to burning and again, if they are soft and under-burned, they should not be permitted on the job. Therefore another test that is fairly accurate is color. The varying grades of brick assume different colors according to burning and the architect soon becomes familiar with the color of good local brick.

Of course, any brick manufactured by concerns having a reputation for making excellent bricks should be specified outright. This is, if you remember, what we advocated through the past articles. It is always a safe bet to specify by name the manufacturer whose product is of consistently high standard. Any manufacturer who has devoted his time in producing a high grade material is entitled to this break and in specifying his product we protect our client and ourselves and in a small way prove to the manufacturer that it is really worth while to have a reputation for the manufacturing of high grade products.

Another point to be watched in selecting brick is the amount of water the brick will absorb. After the brick is in the wall it must withstand weather. If it absorbs water easily a damp condition will result after a continued rain. If it has small power of absorption it will take a continuous rainstorm to penetrate the wall, assuming always that the mortar is good and all joints solidly filled. Absorption should be between 15% to 20%. This is not arbitrary as some bricks will absorb a content up to 25% and still be a very durable brick. A soft brick, of the grade we advise against using, has an absorbing percentage far above the percentage limit mentioned.

There is still another way in which the specifying of brick may be handled. Ofttimes at the time of writing the specifications it is impossible to decide definitely upon the color, texture, etc., of the brick to be used. In this case it is good practice to determine a unit price per thousand that will cover any selection which might be made later. Include this in the specification as follows:

FACE BRICK

This Contractor shall allow $35.00 (determine amount) per M (thousand) for the cost of the face brick. Brick to be selected by the Architect at a later date. Should the brick selected and delivered at the building cost less than the stated allowance, the balance shall be credited to the owner. Should the cost be in excess of the allowance, the Contractor shall be paid the extra cost in excess of the specified allowance. Samples in triplicate shall be submitted to the Architect for approval before any bricks are delivered at the site.

NOTE: *Not over 5 per cent. bats will be allowed for face brick.*

If any special brick shapes are required it must be clearly specified as they must be made specially and are much more costly. Many brick manufacturers carry longer bricks than standard in stock and in the case of glazed brick various inside and outside corners, etc., are stock. This must be looked into carefully and specified thoroughly.

HOLLOW TILE

All structural terra cotta (hollow tile) shall conform to the requirements of the specifications for terra cotta, current edition, of the American Society for Testing Materials. Thickness to be as shown on the drawings. All hollow tile surfaces to receive plaster or stucco shall be seared to provide a key for the mortar. Badly split, cracked or warped tiles will not be accepted for use on any portion of the building.

FLUE LINING

Fire clay tile flue lining shall be of size as shown on drawings and as manufactured by the . . . . . Company.

GYPSUM BLOCKS

Gypsum blocks shall consist of gypsum conforming to the Standard Specifications, current edition, of the American Society for Testing Materials. Thickness of gypsum tiles shall be as indicated on the drawings, rectangular in shape, with square edges, true surfaces and face dimensions approximately 12" x 30".

Here again we can simplify matters by frankly specifying a manufacturer and insisting on his product.

CONCRETE BLOCKS OR TILE

Used for exterior or party walls or piers shall show an average compressive strength of not less than seven hundred (700) pounds per square inch of gross sectional area tested in position as used in the wall. They shall, when composed of concrete weighing in excess of one hundred and forty (140) pounds per cubic foot, absorb not more than 10 per cent. of water, by weight, under twenty-four (24) hour immersion test, except where the average compressive strength is in excess of twelve hundred (1200) pounds per square inch of gross sectional area. When this strength is shown, the absorption requirements may be waived. When composed of concrete weighing one hundred and forty (140) pounds or less the average absorption in per cent., by weight, shall not exceed ten (10) multiplied by one hundred and forty (140) divided by the unit weight in pounds per cubic foot of the concrete under consideration.

All tests on concrete blocks or tile shall be conducted in accordance with the Standard Specifications, current edition, of the American Concrete Institute.

MASONRY WORK

OUTSIDE SCAFFOLDS

All face stone work (insert face brick, if brick is used) shall be laid from an outside scaffold furnished and erected by the Carpentry Contractor. The changing of scaffold planks shall be done by this Contractor.

We always specify outside scaffolding for setting face stone or brickwork as we believe a better and more thorough job results from its use. It is easier for a mason to build plumb and true if facing his work than when he is working overhand. If cost is a very serious item, outside scaffold in smaller work may be dispensed with on occasion.

You will note it is clearly stated that the Carpentry Contractor is to build the scaffold. This is done so that there will be no duplication in scaffold costs. Under the Carpentry Specifications, which will follow in a later article, scaffolding will be covered in detail.

Interior scaffolding for the Masonry is always furnished by the Masonry Contractor. This scaffolding is practically always planking, laid on wood scaffold horses. Should we have an interior of great height unbroken by balconies or levels, where the usual horse scaffolds would be inadequate, it is well to specify complete scaffolding, to be erected and removed by the Carpentry Contractor. Under such conditions it would be required not only for the mason, but also the lather, plasterer, and decorator and possibly the mechanical trades. If such a scaffold is required be sure to specify clearly under each heading that the Carpentry Contractor will build the scaffold but that each trade will use it, moving and relocating the planking where necessary for its own use. [*Continued on page 78*]

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INSIDE SCAFFOLDS

Shall be erected by this Contractor. All backing up shall be laid from an inside scaffold.

BUILDING IN WORK

This Contractor shall, as part of his Contract, cooperate with the Contractors for Structural Steel, Architectural Iron and Bronze, Special Windows and Doors, Mechanical Trades, Rough and Finished Carpentry and other Contractors whose work is to be built into or set in conjunction with masonry. All bedding required shall be executed by this Contractor, under the direction of the Contractor furnishing same.

Under the above heading any special item that might not be customarily included in the masonry should be especially mentioned. Many specifications make a detailed list of what is to be built-in by this Contractor and furnished under another contract. We do not believe this necessary as the majority of work that is built-in by the mason is customarily done and is universal practice.

SETTING STONE AND GRANITE

The furnishing and setting of Granite and Cut Stone is included under another division. This Contractor, however, will be required to cooperate with the Contractor for that portion of the work.

Cooperation is necessary in this instance because the backing-up of the facing is done under this contract. It is necessary that both stone setter and brick mason plan *their work in unison as often constant shifting of workmen* and material is necessary. This is sometimes caused by failure in continuous delivery of face stone, extra unforeseen cutting delaying the setting or extremely fast setting. In any case, it requires shifting of men so that little time will be wasted. If cooperation is lacking there will be constant bickering, trouble, and dispute. Therefore it is better to specify clearly that cooperation is required. In estimating, allowance will be made for time losses due to any of the previously mentioned causes.

CENTERS FOR ARCHES

All arches, whether stone or brick, are to be turned on centers. These centers will be provided under Carpentry and shall be set by the Carpenter.

SLOTS, CHASES, RECESSES, ETC.

This Contractor shall, as a part of his Contract, build all slots, chases, recesses or openings, required for the proper installation of the work of other trades. This work shall be done at the points affected before the work is laid out, according to the dimensions indicated on the Contract drawings or in accordance with information furnished before the work.

NOTE: *Enlarge opening between Boiler and Coal Storage Room. See Drawing No. 1.*

At the end of the paragraph we have noted a particular item of cutting. In this instance, this cutting will be done in the existing building and could easily be overlooked on the plans of the adjoining new building. This is what we mean when we advise noting isolated and unusual items.

BRICKLAYING

All brick shall be thoroughly wet before laying, except in freezing weather. Common brick shall be laid with a shove joint in full beds and be thoroughly slushed up with mortar at every course. All brick shall be laid in cement mortar.

The above paragraph applies to common brick used as backing up face stone. If face brick is to be used for the exterior instead of stone or other facing the following paragraph should be used which will cover both the face and common brick.

BRICKLAYING

All brick, except face brick, shall be thoroughly wet before laying, except in freezing weather. Common brick shall be laid with shove joint in full beds and thoroughly slushed up with mortar at every course. Face brick shall be laid in full beds and have vertical joints completely filled with mortar. All brick, both common and face, shall be laid in cement mortar.

All brickwork shall be built plumb, square and true to the dimensions shown and in bond as hereinafter specified. Brickwork and stonework must be thoroughly bonded or anchored together.

All brickwork shall be built tightly against columns, floor slabs, or other structural parts. Around window and door frames brickwork shall either be kept back a sufficient distance or raked out to permit a caulked joint.

If color or white cement mortar is desired for the face brick joints, it should be mentioned at the end of the preceding paragraph and the wording of the last sentence changed to suit.

Not only should the important point of full horizontal and vertical mortar joints be specified but the Architect should be very careful in his inspection of the work to see that they are full. It is here where 80% of the trouble with leaky walls is conquered. The majority of masons will do decent, solid work. Vertical joints filled solid require a fraction more mortar, therefore no real saving in material can be effected. The careless mason will lay the top course and instead of using the trowel to work the mortar into the vertical joints he will simply parge the brick with a layer of mortar trusting that it will drop into the vertical joints and fill them. If the face brick is backed-up with hollow tile it is absolutely necessary that all brick joints be solid. It is the first 4" of wall that does most of the weather resisting and that 4" must be as tight as possible.

THICKNESS OF JOINTS

The thickness of mortar joints shall not exceed ½" thick for face brick. (Back-up brick, if used, should naturally have the same size joint as the face brick.) Joints in parapet walls shall not exceed ⅜".

The thickness of the mortar brick in face brick work is dependent entirely on the design of the building. The selection of the joint should not be made without due consideration. The wider the joint the more danger of water penetration. This, in a great measure, can be offset by using waterproofed cement mortar. In addition, the thinner mortar joint will increase the strength of the wall. This is less important, though, than the protection which a thinner joint affords against water penetration. All these conditions should be considered in localities where severe rainstorms prevail and the specifications written accordingly.

Again, smooth bricks are less impervious to water than rough faced brick. That is why, in many cases, the buildings of twenty-five years ago show less wall dampness than those today. But for appearance the rough faced brick is preferable. After brickwork has been exposed to the weather awhile the dust, etc., accumulating on the face assists in sealing the pores of the brick. A transparent waterproofing liquid may be painted on the brickwork which will partially protect the wall for a few years until the dirt and dust complete the work. New brickwork will have a greater tendency to allow dampness to penetrate

than old brickwork. It might be well to repeat that the best assurance for the start of watertight walls is solid and full mortar joints throughout the wall.

BOND

Common brick used for backing up face masonry shall be laid five stretcher courses to one header course.

Face brick shall be laid (Flemish, English, Cross Bond, Running Dutch) Bond.

Insert the kind of bond desired and note same on elevations so that there will be no confusion in the mind of the Contractor just how much brick is required.

All pattern work where no standard bond can be used, through headers shall be used where possible in addition to the approved wall ties.

FACING AND BACK-UP

The facing and back-up material shall be carried up together, as closely as possible and, where avoidable, no facing shall be carried up more than five (5) courses ahead of the backing.

BEARINGS

Girders, floor beams or joists and all structural members delivering concentrated loads to the masonry shall rest on solid masonry.

CHIMNEYS

Chimneys shall be built in locations shown on drawings. They shall be constructed of solid masonry (brick or stone) and shall be laid in cement-lime mortar with joints well filled. They shall be lined with fire clay tile flue linings of size shown, built-in as the brickwork progresses and all spaces between flue lining and brickwork shall be filled full with mortar.

If the flue is of such size that flue lining is impractical the following should be specified, omitting that section concerning the lining.

For a distance of 25 feet starting from the clean-out door the inside face of chimney shall be lined with fire brick, set in fire clay and built-in with the brickwork as the work progresses.

Flue tile lining is insisted upon in many building codes and rightly so. The variation in temperature that occurs in a chimney causes stresses that at times open up brick joints or act on the mortar so as to cause disintegration. With a lining (2-foot lengths) the number of joints is reduced and the joints between linings can be made narrower so presenting a minimum of mortar surface to the heat and fumes. This also minimizes the fire hazard and the lining being smooth faced aids the chimney draft. Circular flues are more efficient than rectangular ones.

The use of cement lime mortar is suggested as it stands up better under the severe conditions imposed upon the mortar inside of the chimney. Often the section of the chimney that projects above the roof is laid in cement mortar, the thought being that cement mortar would be better than cement lime mortar when exposed to the weather. This is questionable, for many tall stacks are laid entirely with cement lime mortar.

BACKING CUT STONE AND GRANITE

Brick backing of Granite, Cut Stone, Marble, or Manufactured Stone shall be level with each horizontal course of stonework for a width sufficient to provide a full bearing for the next course. Where it is possible to do this without reducing the joints in brickwork below one-fourth (¼) inch in thickness, split courses will not be permitted. The brick backing shall follow closely the setting of Granite, Cut Stone, Marble, or Manufactured Stone.

JOINTING

Joints of all exposed exterior or interior common brickwork shall be neatly struck.

PARTITIONS

All hollow tile for partition work shall be set in cement and lime mortar. The tile shall be set to bond, breaking joints in all cases. Where tiles are set with cells horizontal they shall be set on full mortar beds not exceeding one-half (½) inch in thickness with vertical joints buttered full on walls and webs. Where set with cells vertical the bearing members shall be buttered and vertical joints slushed full of mortar.

When tile partitions are shown intersecting or abutting each other, they shall be regularly bonded, avoiding all continuous perpendicular joints. Where partitions intersect or abut walls they shall be securely anchored with approved metal ties or otherwise satisfactorily keyed. The tile shall be carefully fitted around all door and window openings.

Where double partitions are indicated on drawings they shall be bonded together with cross walls of same material, spaced not more than (10) feet apart. Partitions shall be tightly wedged against arches or floor slabs above. Wedging shall be done with tile or slate wedges.

Supposing the facing of this building were brick backed up with hollow tile or concrete blocks the following specifications should be used.

SETTING CONCRETE BLOCKS OR HOLLOW TILE

Where blocks or hollow tile is specified or shown on drawings as backing for brick, or other material, the facing material shall be securely bonded to the backing. Where the facing consists of common brick or face brick laid with headers, the headers shall be bonded into the backing every fifth course of brick. Where headers or other bonding units are not permitted in the facing material, approved metal ties or other means of bonding, satisfactory to the Architect, shall be furnished as shown on the drawing.

If the concrete block or hollow tile is used for exterior or party wall construction the following paragraph should be used.

SETTING CONCRETE BLOCK OR HOLLOW TILE

Hollow tile used for exterior and party walls where shown on drawings or noted in the specifications shall be set in cement mortar. They shall be laid plumb and true to dimensions given with tile set to bond and breaking joints in all cases. Where tiles are set with cells horizontal they shall be set in a full bed of mortar, not exceeding ½" in thickness, with vertical joints buttered full on walls and webs, where set with cells vertical the bearing member shall be buttered and vertical joints slushed with mortar. (Specify type of joint.)

COLUMN COVERING

Covering for interior columns shall be built close to the outer faces of the columns but space between tile and steel need not be filled.

Column covering shall start on the top of the floor arches or slabs and be carried up to and be tightly wedged under the soffit of arches or slabs and beams above. Each course of tile shall be set breaking joint with the one below.

No piping shall be enclosed in the column covering, except electric or other conduits, which shall be erected before the column covering is set.

CONTACT WITH STEEL

Where stone, brickwork or any other material under Mason Contract rests on or abuts steel, it shall be separated by a mortar joint. This refers especially to mason work resting on lintels.

General for all Masonry

In warm weather, all bricks shall be thoroughly wet before laying. Neither bricks, blocks, nor tile shall be set when the temperature is below twenty (20) degrees Fahrenheit without the Architect's permission. When permission is given it will be on the understanding that this Contractor provides a satisfactory method of heating materials before setting and protection of finished work against freezing.

Patching

If, during construction, walls, partitions or arches become displaced or damaged by this Contractor, or others under his control, this Contractor shall, without additional compensation, execute all patching and repairing necessary to leave the entire work in perfect condition.

Walls, partitions or arches displaced or damaged by Contractors over whom this Contractor has no control, shall be replaced or repaired by this Contractor under written instructions from the Architect. Such work will be paid for as an addition to this Contract.

Protection for Masonry

Care must be taken that the tops of all unfinished work are thoroughly covered or protected each night against stormy weather, by means of waterproof paper, boards, canvas, or other approved means. Carpentry Contractor shall place boards over all window sills when this work is completely finished.

Protection of all work liable to damage, whether unfinished or finished, should be enforced. Much breakage and damage will be avoided with appropriate protection. The repairing or replacing of such damaged work usually means delay, controversies, and trouble. Responsibility must be placed and the offender forced to pay for the damage caused by carelessness. And after all has been repaired or replaced it is never as satisfactory as when first built-up.

Laying Masonry in General

Before starting mason work on concrete walls, this Contractor shall thoroughly *sweep and wash the top surfaces. In laying masonry work flat surfaces shall be brushed clean of loose, dry mortar, and all mason work kept clean of dry mortar or dirt so that in all cases mason work shall be laid on flat, clean surfaces.*

Cleaning

All interior brickwork shall be cleaned of mortar accumulations or knobs of mortar to the satisfaction of the Contractor who shall apply the Par-Lock.

Setting Steel and Miscellaneous Iron Work

This Contractor shall bed bearings plates for steel lintels over all square headed openings in exterior and interior walls at proper level, and set in lintels. The lintels shall be furnished and distributed by the Steel Contractor and they shall be set in a bed of mortar.

Also set all miscellaneous iron work furnished by other contractors. The flashings furnished by Roofing Contractor shall be set by this Contractor, setting same in a bed of mortar, and place a bed of mortar on top before starting mason work so that flashing in wall will not come in contact with mason work. Leave chases in walls as shown or required by various Contractors.

Setting of Windows and Doors in Masonry

All doors and window frames shall be set in mortar and built-in, with masonry. Before mortar has set joints around doors and window frames shall be raked out half inch to prepare them for caulking. Joints around doors and window frames shall be caulked with oakum and filled with elastic cement. Caulking in this Contract Caulking compound (elastic cement) shall be . . . . . .(insert name) as manufactured by the . . . . . Co.

(Give address always so that Contractor will have no difficulty in getting contact.)

Building-in window and door frames in mortar and caulking them solidly is absolutely essential if a water and airtight job is desired. Without it there will be leaks that will be impractical to remedy after the job is complete. To caulk later will result in a hideous and sloppy appearing job, undesirable to any Architect or Owner.

Putlocks

The placing of putlocks in masonry walls is prohibited.

The use of the putlock scaffold has caused many arguments for and against. The only reason we do not permit its use is that every putlock leaves a hole in the wall and we believe that it is impossible, from a practical viewpoint, to patch any kind of masonry and have the same resultant job as though the wall had been continuous when originally carried up. It is not very much more costly to erect a self-supporting scaffold that is independent of the wall for support, which makes it possible to finish the wall as it progresses. Many will disagree with me on putlocks.

Radiator Reveals

Under windows, as noted on reveal schedule Drawing No. 4, provide reveals in wall for radiators.

If radiators are exposed, this paragraph will be omitted, but as concealed radiation will be used more and more, even in the cheaper work, this paragraph will be necessary.

Ventilating Bricks

Furnish one (1) . . . . . 4⅜ x 8 casting transforming to a 6" flue, as manufactured by . . . . . Company.

The use of this metal brick grille with air intake is to provide ventilation to spaces such as under floor beams, unexcavated sections of the foundation, etc. This prevents either damp or extra dry conditions in such spaces and retards any form of rotting or disintegration to wood or metal. It is used to advantage in roof spaces that have no other form of air supply to ventilate them. We have found them very desirable.

Building in Flashing

This Contractor shall properly build in flashings and overflow roof pipes as shown on drawings or as specified and furnished under Roofing and Sheet Metal where flashings are to be built in masonry.

Cleaning

All face brick at final completion, or when so directed by the Architect, shall be washed down, cleaned and pointed.

All walls of common brick exposed on the exterior or forming finished interior surfaces shall be cleaned at the completion of the building.

Incinerator

The specification for any incinerator is dependent on the design of the particular one to be used. The type and number should be determined and the manufacturer's name specified. As 90% of the incinerator is masonry it properly belongs under this specification. Specify as follows:

This Contractor shall build the incinerator of brick in accordance with the working drawings furnished by the manufacturer. Incinerator equipment with clean out doors, grates, screens, etc., to be furnished under Miscellaneous Iron Division. [*Continued on page 70, Ad. Section*]

Plastic Paint

An Aid to Effective and Individual Interior Finishing

By Jeannette Kilham *

Every paint manufacturer looks forward to the happy day when the architect will regard walls and ceilings primarily as potentially paintable areas, and will instruct his client to look on them as potentially repaintable areas.

Such an anticipatory view of the rôle of paint is quite within the bounds of taste and reason. Paint was used by the ancient Greeks and Egyptians extensively, and with art, to glorify their temples. Paint, in the dual rôle of color and texture, will be in the future as seriously considered in drawing up the specifications for building as the cement for the foundations or the covering for the roof. Already, in some of the most modern of contemporary interiors in continental Europe, we frequently find paint highly instrumental in creating a required architectural effect; a sunny wall subdued by gray, a shaded one illumined by yellow, different planes in different colors—drama, life, precision, style, are achieved through paint.

In this country big business has recently discovered that the happy use of color produces a most favorable reaction upon the observer. Manufacturers of floorings, wall coverings, plumbing fixtures, bed coverings, draperies, glassware, etc., have sent forth scouts to the furthermost limits of the country. At vast expense they have gleaned the invaluable information that, for instance, while the ladies of the Northwest will buy anything provided it has an orchid tinge, their sisters of the Southeast cannot resist peach.

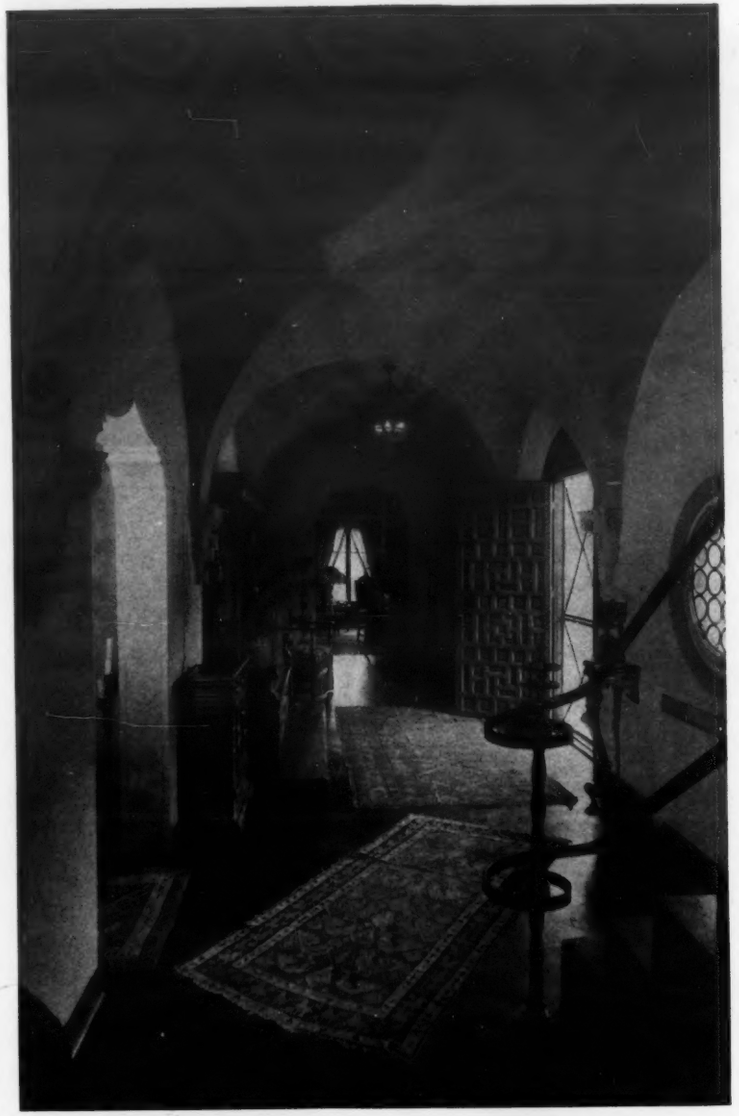
Recently a salesman employed by a certain plastic paint company conducted on his own, just to be different, a similar color survey of the opposite sex. His firm

* *Art Director, Craftex Company*

ITALIAN GALLERY, ITALIAN ROOM, BOSTON MUSEUM OF FINE ARTS, BOSTON, MASSACHUSETTS

HENRY AND RICHMOND, ARCHITECTS

Walls textured in plastic paint in a pinkish beige color; trowelled flatly and overglazed with white.



HALLWAY IN RESIDENCE OF M. S. MANNES, ESQ.

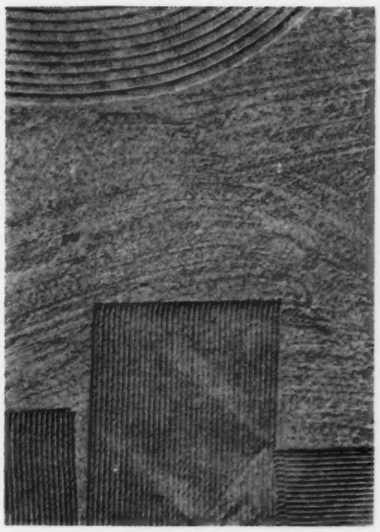
JOHN MATTHEWS HATTON, ARCHITECT

The walls and ceiling are finished in plastic paint; the walls in oyster white stippled, glazed in umber. The ceiling is Italian blue water float, glazed in umber.

AN INTERIOR IN THE PANHELLENIC HOTEL, NEW YORK

JOHN MEAD HOWELLS, ARCHITECT

The walls are finished in an apricot-colored rough texture stippled with silver, showing a most imaginative treatment.



INDICATING POSSIBLE TEXTURES

manufactures, as one of their lines, a water mixed lithopone paint which comes in lovely shades of white, ivory, gray, yellow, rose, green, and turquoise blue. He succeeded in getting this paint specified for the cells of a new penitentiary, and suggested that each convict be allowed to select from the line the shade, or shades, he wished for his own particular cell. For some time the authorities held out on him, contending that the inmates would all demand the more violent shades. Their fears proved groundless, however, for ninety per cent. selected ivory.

A survey of the architects, in order to ascertain their favorite color, has not yet been made, but undoubtedly the same per cent. would conservatively put in their vote for ivory also. Architects in general think too little about color and would rather be on the safe side than venture the new and untried, however alluring. The fact is that not only color but texture offers such simple solutions to the interior treatment of walls and ceilings that the architect is apt to mistrust or overlook them. He should realize that modern paints have become not only an inexpensive but a most effective means of individual expression in interior design.

It is an actual fact, for instance, that within recent years paints have been invented which combine both color and texture, paints so lasting that they come definitely within the class of such permanent materials as plaster and masonry surfaces, interior trim, etc.; in other words, plastic or texture paints. The architect should know all the possibilities of these plastic paints not only in order to insure the maximum of effect with the minimum of effort in the application of the material, but because these same plastic paints are a valuable addition to the vocabulary of the architect who realizes the importance of interior finishes.

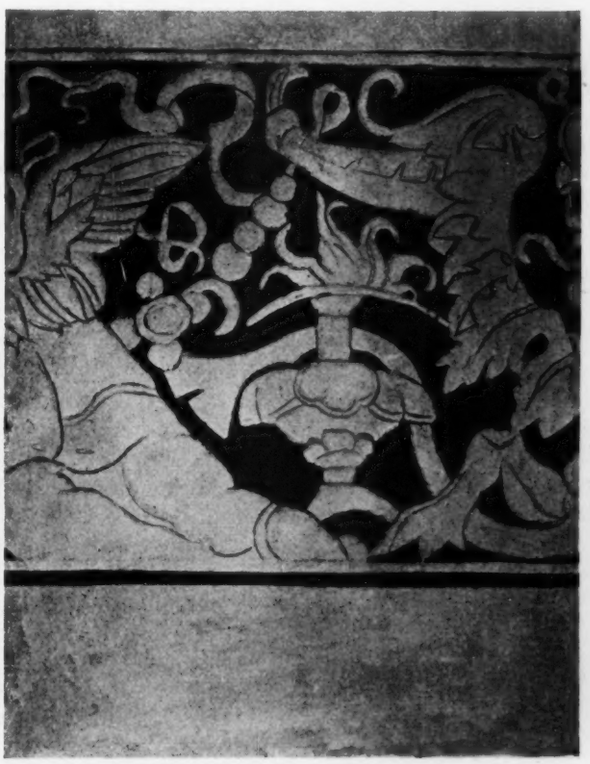
Most architects feel themselves overburdened and distracted by an undue amount of detail, and quite rightly. Yet economy and even versatility of design can result from a thorough knowledge of the limitations and possibilities of the means at one's disposal. An architect should take a dip into the working theory of every material he uses, even into paint, and more especially into plastic paint.

To begin with, when an architect specifies a certain brand of plastic paint he should make sure that he gets the material he asks for. Substitution of an inferior material for genuine brand of plastic paint is altogether too common. All plastic paints have the trade name and mark on the bag, or other container, and these should be identified before they are opened up by the person in charge of the job.

SOME OTHER TREATMENTS

The application of the material itself is extremely simple, as it is applied with a brush like any other paint. It may be applied to any surface which can be successfully painted. The surface should naturally be free from grease or dirt; and all whitewashes, calcimines, etc., previously applied to the wall should be removed. A new plaster wall should be sized to insure uniform suction and prevent lime burning through. Any architect who has had experience with irate clients due to "hot spots," areas of unslaked lime in the plaster which burn through and affect the wall color, will hasten to take this precaution. Any of the higher grade oil or varnish sizes, sealers, or surfaces, or Chinawood oil, reduced to penetrating consistency, are satisfactory for use under plastic paint.

All types of wall boards, pulp and fibre boards, as well as gypsum and insulation boards, are becoming so generally used by architects today that it is interesting to note that plastic paint will insure a uniform unbroken covering over these surfaces. It is important to ascertain before starting the plastic paint job that the joints of the boards are filled according



PORTION OF A SGRAFFITO FRIEZE

An effective form of craftsmanship well adapted to plastic paint.

SERVICE DEPARTMENTS

THE MART. In this department we will print, free of charge, notices from readers (dealers excepted) having for sale, or desiring to purchase books, drawing instruments, and other property pertaining directly to the profession or business in which most of us are engaged. Such notices will be inserted in one issue only, but there is no limit to the number of different notices pertaining to different things which any subscriber may insert.

PERSONAL NOTICES. Announcements concerning the opening of new offices for the practice of architecture, changes in architectural firms, changes of address and items of personal interest will be printed under this heading free of charge.

FREE EMPLOYMENT SERVICE. In this department we shall continue to print, free of charge, notices from architects or others requiring designers, draftsmen, specification writers, or superintendents, as well as from those seeking similar positions. Such notices will also be posted on the job bulletin board at our main office, which is accessible to all.

SPECIAL NOTICE TO ARCHITECTS LOCATED OUTSIDE OF THE UNITED STATES: Should you be interested in any building material or equipment manufactured in America, we will gladly procure and send, without charge, any information you may desire concerning it.

Notices submitted for publication in these Service Departments must reach us before the fifth of each month if they are to be inserted in the next issue. Address all communications to 419 Fourth Avenue, New York, N. Y.

THE MART

Keith H. Davenport, 13 Delaware Apartments, Mason City, Iowa, has the following books for sale: Varon's *Indication in Architectural Design*, $3.00; Van Pelt's *Essentials of Composition*, $1.85; also 22 others. Send for list.

Robert Ronowski, 410 N. Edgewood Avenue, La Grange, Illinois, has the following for sale: Haneman's *Architectural Composition*, $5.00; A.I.A. Handbook of Architectural Practice, $4.00; Knobloch's *Good Practice in Construction*, Volumes I and II, $6.50; Clute's *Drafting Room Practice*, $4.00; Clute's *Practical Requirements of Modern Buildings*, $4.00; D'Espouy's *Fragments d'Architecture Antique*, $4.00; Coffin's *How to Study Architecture*, $1.00; Statham's *History of Architecture*, $2.00; Greeley's *Essence of Architecture*, $1.00; Building Ordinances of Chicago, 25c.; Harbeson's *Study of Architectural Design*, $6.00. Postage paid. All books in excellent condition, many new. Also *Architectural Record*, from May, 1928, issue, to present date, bound in three volumes, advertising removed.

Albert Sheldon, P. O. Box 552, Grand Central Annex, New York City, would like to purchase back numbers of the *Beaux-Arts Bulletin of Design*, single copies, or by the year.

David H. Jacobs, 21 Mulberry Street, Cincinnati, Ohio, has the following copies of PENCIL POINTS for sale: May, June, July, August, and September, 1930, all in good condition.

Mark S. Gladulich, 4515 N. Broad Street, Philadelphia, Pa., would like to dispose of the following *White Pine Series:* Vol. 1, Nos. 1, 2, and 3; Vol. 2, Nos. 2 and 5; Vol. 3, Nos. 2, 3, 5, and 6; Vol. 4, Nos. 1, 2, 3, 5, and 6; Vol. 5, Nos. 1, 2, 3, and 5; Vol. 6, Nos. 1, 2, 5, and 6; Vol. 7, Nos. 1, 2, 5, and 6; Vol. 8, Nos. 1, 2, 3, 5, and 6; Vol. 9, Nos. 1, 2, 3, 5, and 6; Vol. 10, Nos. 1, 2, 3, 4, and 5; Vol. 11, Nos. 2, 3, and 4; Vol. 12, Nos. 2, 5, and 6. Also a copy of the November, 1928, issue of PENCIL POINTS, with slightly torn cover, and February and March, 1929, issues.

PERSONALS

FRANK M. MAHONEY, ARCHITECT, has established his individual practice, with offices at 190 Main Street, Northampton, Mass.

JULES E. KORCHIEN, ARCHITECT, has opened an office at 56 West 45th Street, New York, N. Y.

CLARENCE CULLIMORE, ARCHITECT, has reopened his office for the practice of architecture at 10 Oleander Avenue, Bakersfield, Calif.

ARTHUR WILLIAM OSBERG, ARCHITECT, has moved from Concord, New Hampshire, and has opened new offices at 795 Elm Street, Manchester, New Hampshire.

ARTHUR W. VARIAN, ARCHITECT, has opened an office for the practice of architecture at 30 West Avenue, South Norwalk, Connecticut.

FRANCIS S. GURDA, ARCHITECT, has removed his offices from 448 Mitchell Street, to 733 West Mitchell Street, Corner So. 8th Street, Milwaukee, Wisconsin.

HOWARD STEITZ, ARCHITECT, has opened offices in the Architects' Building, 217 East Avenue, Rochester, New York. The former address was 815 Wilder Building.

GEORGE HUTCHINGS, ARCHITECT, recently of New York and Boston, has opened an office for the practice of architecture in the Somers Building, Hamilton, Bermuda.

R. N. LE VEE AND W. H. GMEINER have opened architectural offices at 601 W. College Avenue, Appleton, Wisc., under the name of Le Vee & Gmeiner.

FREDERICK O. ANDEREGG, Ph. D., announces the opening of an office at 206 Fulton Bldg., Pittsburgh, Pa., for a consulting practice on building materials, including Portland cement, cement products, and masonry.

CYRIL SAUNDERS SPACKMAN, R.B.A., L.R.I.B.A., F.S.A. Scot., F.R.S.A.I., etc., of 29 Blake Road, East Croydon, Surrey, England, late of Cleveland, Ohio, wishes to thank publicly those architects, sculptors, and firms who have so kindly contributed photographs, etc., for his lectures, books, etc., on American Architecture and Sculpture. He will be pleased to receive material from those who have not contributed.

OTHER FREE EMPLOYMENT SERVICE ITEMS WILL BE FOUND ON PAGES 74, 76, and 77, ADVERTISING SECTION

ELDORADO PENCIL TALKS

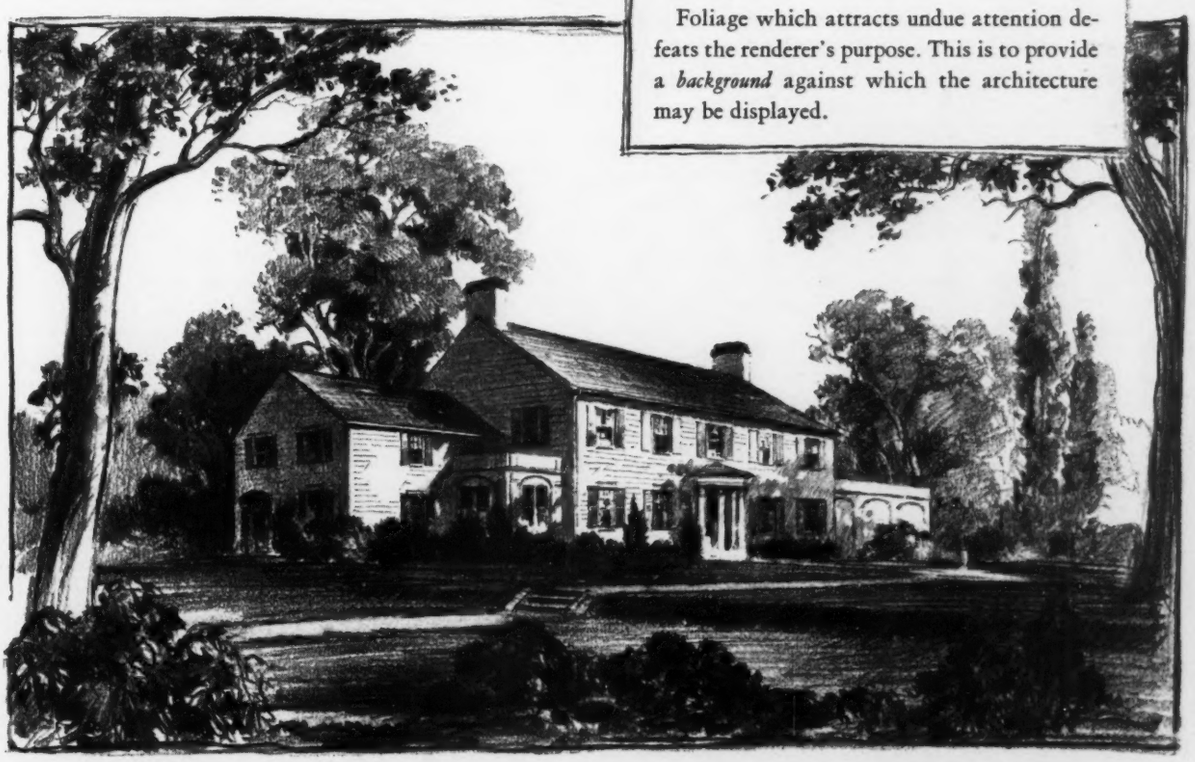
about "SPOTTY" Foliage

This is the way Not to do it!

Spotty foliage is a common error. Too much insistence upon light and shadow upon the tree masses is responsible for it.

Contrast upper and lower sketches. Below, the foliage is treated more as a silhouette, to give a quiet unobtrusive environment for the building.

Foliage which attracts undue attention defeats the renderer's purpose. This is to provide a *background* against which the architecture may be displayed.



THIS is the first of a series of Eldorado sketches by Mr. Watson. All Eldorado grades, from H to 4B were used. For opacity of line, for responsiveness, for uniformity, for correctness of grading, its leads make Eldorado "the master drawing pencil." Architects, write for samples to Eldorado Sales Dept., Joseph Dixon Crucible Company, Jersey City, New Jersey.

PLASTIC PAINT

(Continued from page 83, Editorial Section)

to the specifications of the manufacturer of the particular type of board.

Plastic paint usually comes in a powder form ready to be mixed with water to a thick paste. Dry color may be applied to the mix, but in most cases it is more satisfactory to apply the material uncolored, to size it when dry, and to apply the color in a finishing glaze which is washable.

What advantages from an æsthetic standpoint are to be derived from the use of plastic paint? "A gentle flavor of mild decay," the unenlightened architect might answer promptly, indicating how little he really knew about the function and uses of plastic paint.

Plastic paint has indeed filled a long felt need in the reproduction of the antique wall. But this is only one version of its usefulness to the architect. Such is its versatility that it can be admirably adapted to any type of interior, either of precedent or modern inspiration.

The fact that the slightly textured plastic background is the most generally flattering setting for works of art has long been recognized by museum authorities. Many types of furniture and hangings are incredibly enhanced by a setting of textured walls. Plastic paints, moreover, provide a simple and inexpensive solution of the decoration of large and monotonous wall spaces which every church, theatre, hotel, store, and office building presents. Interest and vibrancy are given such surfaces by breaking them up with a subtle hint of light and shade. In short, the textured wall surface gives a feeling of richness and warmth to wall surfaces which would be difficult to attain by any other means.

Plastic paints are invaluable in remodelling and with them remarkable and rapid transformation can be easily effected. Almost overnight a Louis XVI salon can be changed into an Early American interior, or a Georgian room into one styled modernistic, or vice versa.

The architect who specifies plastic paint occasionally asks the best method of curbing the painter's fancy for the busy surface. One can obtain from the most representative manufacturers of plastic paint samples made up on heavy board of any color or texture specified, with directions for reproducing attached. Certain firms of plastic paint manufacturers also employ men with architectural training as consultants who are glad to confer with the architect as to the most satisfactory application of their product.

The increasing standardization of building and decorative materials makes the production of a personal style of architecture more and more difficult. As Mr. Pitkin remarks in *The Twilight of the American Mind*—"The chances for highly intelligent and individual expression in architecture are steadily dwindling. Building laws, trade standardization of bricks, stone, steel, cement, glass and everything else; and the insistence of clients upon a few elemental demands all make to this end." A wall finish such as plastic paint which cannot be standardized, and with which an infinite range of texture and color effects is possible, is bound to be popular with the architect who desires to create with originality.

Most architects do not realize when they say, "Oh, I know all about plastic paint finishes," that what they have in mind is one type only; the conscientiously rough surfaces brought on by the popularity of the Spanish style of interior. The newest texture finishes are very different in character. They have a suggestion of texture rather than a marked pattern surface. As one architect expresses it, "The waterfloat finish is so much more beautiful than hand-modelled plaster that we do not need to even compare it with old walls." Moreover, this new finish takes considerably less time than the old sponged and trowelled surfaces. It is achieved simply by floating the surface with an old whitewash brush and water.

The prejudice which some architects may have against the use of synthetic materials is beginning to be regarded as mid-Victorian. It is fast becoming as rare as their prejudice against synthetic drinks. We are beginning to realize that through science and art we can manufacture synthetic building and decorative materials as romantically beautiful and as enduring as the porphyry, alabaster, ebony, crystal, and ivory of the ancients.

Wonderful things can be done in plastic paint by opposing a floated with a brush texture, by taping off bands and stencilling them in raised effect and silvering them or incising simple motifs on the wet material. The technique of the material is simple and with a little imagination the architect can create distinguished and entirely individual interiors at a very nominal cost.

WHYS AND WHEREFORES OF THE SPECIFICATION

(Continued from page 80, Editorial Section)

In this particular building we decided to face the entire Basement and main stair halls to the Basement with a special texture tinted tile providing the cost was not excessive and could be included in the budget. This item was covered as follows:

TILE FOR BASEMENT—ALTERNATE

An alternate estimate will be accepted for furnishing and laying . . . . . , as manufactured by the . . . . . Co., from floor to ceiling in the entire basement.

All exterior walls including the wall between the new and old basement is to be laid up on the interior side from floor to ceiling with 5" x 12" x 1⅞" . . . . . furring, including cove base. All interior partitions marked "4", except those around toilet rooms are to be laid up from floor to ceiling with 5" x 12" x 3¾" 2-faced tile, with cove base. The walls around toilet rooms are to be faced on the outside only, the inside to be scored.

This alternate material will replace all scored partition tile in the basement as well as all plastering with the exception of the sloped window sills and the proscenium arch which are to remain as detailed. The tile wainscot with plaster above, in the toilet rooms, also the Par-Lock dampproofing, are to remain as specified.

All . . . . . to be first quality shade No. 50 light range, with the exception of the cove base which is to be shade No. 90.

The . . . . . is to be laid in cement mortar, as specified with full bed joints ¼" thick. The back edges of the . . . . . furring are to be covered with mortar to provide a band with the Par-Lock dampproofing grit key.

A Public Duty for All Architects

Urge the National, State, and City Governments to Act Quickly!

In our December issue we printed an open letter from the Washington State Chapter of the American Institute of Architects advocating the employment of local architects to design the huge amount of construction work about to be undertaken by the government rather than to have all this work planned by the existing government organizations. This idea is gaining headway but it still needs the active support of all architects if it is to be adopted in time to help to relieve unemployment. A letter to the *New York Times* by Ethan Allen Dennison of New York states the case quite clearly. He says, "The government has promised for the relief of unemployment that approximately a billion dollars' worth of construction work will be started within a few months. If this work is to be planned by government architects and engineers, it will be many years before the effects of such an enormous program will be felt.

"These large expenditures for construction work will be slow in attaining the desired results because of our government's limited engineering and architectural organizations. The result of this expenditure will be to keep these government organizations busy and rushed, but the work cannot possibly be given out to building contractors in time to relieve the unemployment situation.

"To make ready the necessary plans to permit the starting of this enormous construction program, and to avoid competition between the government and the architectural and engineering professions, a large part of the work should surely be planned outside of government organizations. Hardly any profession or industry has felt the depression more than architects and engineers. If the unemployment situation is to be improved, it is evident that the plans must be hastened for putting under way the large building program authorized by Congress.

"Benjamin F. Betts, editor of *The American Architect*, states: 'To engage a local architect for each government project would have a far-reaching effect, and at once start in rotation the wheels of the building industry. It would give a large number of architects needed employment, together with a large force of draftsmen, specification writers, engineers and clerical help. In a relatively short time a yet larger number of contractors would begin to function, thus absorbing skilled craftsmen, mechanics and laborers. Material dealers and producers of materials employing thousands of men and women would resume their activities. Much money would soon be put in circulation, and other commercial activities would be in demand.'

"This State has a large engineering organization and handles most of its own work, a large part of which is probably delayed by inadequate planning facilities, although in the case of New York City some of the work has been given to resident architects, and to the few who are successful in obtaining contracts this has been a decided help.

"Neither the government nor the State of New York, however, has of late offered much work, if any, to architectural and engineering competition."

It has been suggested by a United States congressman that Mr. Dennison's letter should be given the widest possible publicity, that copies of it should be sent to every prominent architect in the country with the request that each of them communicate with his local congressman and his two United States senators in order that all members of congress may be informed of the importance of early action. We urge every architect who reads these lines to act on the suggestion at once. Every ounce of pressure that can be brought to bear will have its effect and assist in the return of good times.

Another suggestion from the same congressman is that arrangements should be made by a selected group of architects for an interview with President Hoover to engage his support for the movement. Perhaps this is already being done but if not it should be.

Not only should the national government be urged to alter its policy but architects everywhere should seek to get state and municipal work to go ahead more rapidly than will be the case if the planning and design of these projects are left entirely to the state and city architectural departments. Architects can, if they will, lead the way back to prosperity rather than wait for the procession to go by, leaving them to bring up in the rear. It is their public duty to do so, and by doing it they will not only help to relieve unemployment but will go far towards winning from the public much-needed recognition for their profession—all of which will help to put the practice of architecture on a firmer footing than it has been in the recent past.